NICER GO Cycle 4 - List of Accepted Proposals

Prop #	Title	PI Name	Abstract
5001	THE FIRST X-RAY POLARIMETRY AND SPECTROSCOPY OBSERVATIONS OF TRANSIENT BLACK HOLE X-RAY BINARIES	FIAMMA CAPITANIO	We propose 3 joint NICER+NuSTAR ToOs observations of transient black hole X-ray binaries to be taken in coordination with IXPE, a NASA-ASI mission that will be launched on Dec,9,2021.The first year IXPE observing plan includes up to 3ToO of TBHXB in outburst.Each ToO includes one long exposure in the hard state and another in the soft(> 300ks). We propose(for each ToO) two 30ks NICER+NuSTAR exposures during the hard state IXPE pointing and one 20 ks NICER+NuSTAR exposure during the soft state IXPE pointing. This will provide an unprecedented combination of X-ray polarimetry, high resolution spectroscopy and timing; yielding unique information on coronal geometry, blackhole spin and role of the jets
5005	MONITORING X-RAY PULSARS FOR GRAVITATIONAL WAVE SEARCHES	WYNN HO	We propose monitoring campaigns for five radio-quiet X-ray-only pulsars (PSR J0058-7218, J0537-6910, J1412+7922, J1811-1925, and J1849-0001), all of which can only be done with NICER observations. These data allow computation of an accurate phase-connected timing model for each pulsar, which enable LIGO/Virgo/KAGRA to perform the most sensitive gravitational wave searches from these young, fast-spinning, and potentially strong gravitational-wave emitting pulsars. We request multi-year observations since contemporaneous data are needed and the next gravitational wave observing run is scheduled to begin in mid/late 2022 and run for one year until mid/late 2023. High cadence observations of PSR J0537-6910 will also further refine and test this pulsar's unique glitch behaviors.
5006	OBSERVING THE NEXT X-RAY BINARY - RADIO MILLISECOND PULSAR TRANSITION WITH NICER	SLAVKO BOGDANOV	In recent years, three millisecond pulsar binaries have been observed to switch between accreting and rotation-powered pulsar states, thereby unambiguously establishing the long-suspected link between low-mass X-ray binaries and "recycled" pulsars. In the low-luminosity accreting state, they exhibit X-ray and optical variability unlike anything observed in other X-ray binaries. We propose a continuation of the NICER Cycle 1 and 2 Target of Opportunity program to trigger on the next nearby binary recycled pulsar transformation to an accretion disk state. This would result in an improved understanding of the peculiar phenomenology of these systems, which, in turn, may shed light on the little-understood physics of the quiescent regime in NS X-ray binaries.

Prop #	Title	PI Name	Abstract
5014	BLACK HOLES TRANSITIONS: NICER AND MULTIWAVELENGTH	TOMASO BELLONI	Black hole X-ray binaries (BHXBs) cycle through different accretion states rapidly, providing a time-resolved view of how matter behaves in a strong gravity environment. Simultaneous multi-wavelength observations are the optimal tool that exposes this view. However, these campaigns (connecting the evolving accretion inflow and jet outflow) have been rarely achieved. We request a TOO consisting of five 10ks NICER visits of a BHXB as it transitions from the hard to the soft state to complement Astrosat/INTEGRAL/HXMT coverage. Our target list contains 15 candidates. We target the transition to reveal both the rapid orbit-to-orbit X-ray variability and the slower X-ray variability that characterize the significantly changing accretion disk (derived from X-ray spectra and timing).
5015	NICER TIMING OF THE TRANSITIONAL PULSAR PSR J1023+0038: A UNIQUE TESTBED FOR LOW-LEVEL ACCRETION PHYSICS	SLAVKO BOGDANOV	In 2013, PSR J1023+0038 transformed from a rotation-powered radio millisecond pulsar state to an accretion-disk-dominated X-ray pulsar state, where it has remained since. In its current accretion-disk state it shows coherent X-ray pulsations, suggestive of active accretion onto the neutron star surface at very low luminosities (~10^33 erg/s). Using these pulsations we have found that in the X-ray state the pulsar is spinning down ~25% faster than in the radio state. We propose to extend our long-term timing solution with NICER through an impending state transition in the near future, which would be immensely helpful for understanding how tMSPs undergo sudden state transitions and enable us to constrain accretion models.
5019	A NICER VIEW OF BLACK HOLE X-RAY BINARY OUTBURSTS IN THE SOFT X-RAY BAND	JIACHEN JIANG	We request a monitoring program of one of six black hole transients with low Galactic reddening when in outburst, consisting of 20 observations each with 6 ks exposure. With our proposed observations, we will be able to study the inner accretion process during an outburst, such as the inner radius and the temperature of the disk. In particular, we will measure the inner disk density and compare the densities in different states. Previous tests for the high density disk model focused on sources with moderate Galactic column density. No soft X-ray observations without pile-up effects for our proposed transients are available in the archive. Our observations will be triggered by the MAXI and Swift-BAT monitoring program.

Prop #	Title	PI Name	Abstract
5020	FOLLOW-UP HARD X-RAY TRANSIENTS IN THE MAGELLANIC CLOUDS	GEORGIOS VASILOPOULOS	The Magellanic Clouds (MCs) harbor a large sample of Be/X-ray binaries at a moderate and well known distance with low Galactic foreground absorption. However, their transient nature complicates observations in X-rays. We propose five triggered NICER observations of new or unexplored high-mass X-ray binaries (HMXBs) in the MCs. Our goal is to study their spectral and temporal properties, and build-up a large sample of pulsars in order to study their demographics in the MC system.
5021	CATCHING THE NEXT OUTBURST OF IGR J00291+5934	PETER BULT	We propose to observe the next outburst of the AMXP IGR J00291+5934 with NICER. Specifically, we request a total of 150 ks in observing time to monitor the full 2-week outburst at high cadence. We expect that this monitoring campaign will yield a rich data set that allows for multi-faceted investigation of this accreting pulsar; including a study of the long-term neutron star spin evolution and torquing mechanisms driving it; the binary evolution of AMXPs; and the magnetospheric interactions between the variable accretion flow and the neutron star itself.
5025	MONITORING THE NEXT OUTBURST OF IGR J17480-2446 (TERZAN 5 X--2): A LAB FOR STUDYING THERMONUCLEAR BURNING REGIMES	GIULIO MANCUSO	During its first and only outburst in 2010, the 11 Hz accreting pulsar IGR J17480-2446 became one of the most prolific X-ray bursters known to date, showing all type of bursting regimes, in qualitative agreement with theoretical models of thermonuclear burning, but showing also substantial deviations from them. Here we propose 240 ksec ToO observations to monitor the next outburst of the source. These observations will allow us to study, among others, the interaction between the accretion disk and the flux coming from the X-ray bursts; the spin-up evolution of the NS as a function of the accretion rate and the connection between the accretion rate and the marginally stable burning.

Prop #	Title	PI Name	Abstract
5026	THE DISCOVERY OF THE NEW SOURCE WITH MILLIHERTZ QUASI-PERIODIC OSCILLATIONS	GIULIO MANCUSO	Quasi-periodic oscillations (QPOs) at frequencies of millihertz (mHz) have only been reported in a few neutron star (NS) systems since their discovery. Given their close relation with the occurrence of type I X-ray bursts, numerical simulations strongly suggest that mHz QPOs are due to a special mode of burning, called "marginally stable nuclear burning". However, even though model predictions agree well with the observations, there are still many open questions. Here we propose, after having detected the mHz QPOs with any instrument, and within the next few days, 50 ksec ToO observations to study the mHz QPOs in the next NS system that shows them. These observations will allow us to test whether the oscillations can be described as temperature fluctuations originating on the NS surface.
5030	FAST MULTI-WAVELENGTH VARIABILITY FROM A BH	THOMAS MACCARONE	We propose 12 observations of a black hole transient of 3.6 ksec each with NICER to be made simultaneously with VLT fast-timing measurements in the infrared. These data will be used to understand the evolution of the IR/X-ray cross-correlation function, the lags in which give fundamental information about the speed of the relativistic jets in these systems. NICER will allow high throughput and access both to the geometrically thin and geometrically thick spectral components in the accretion flow. By observing the evolution of this cross-correlation function we will be able to make the first observational study of the evolution of the jet speed in X-ray binaries.
5031	FOLLOWING THE PULSE EVOLUTION OF IGR J17062-6143	PETER BULT	We propose to observe the AMXP IGR J17062 for a total exposure of 150 ks during the NICER cycle-4 GO program. With these observations we will be able to measure the small pulse amplitude of this source at two epochs, thereby verifying if its recent oscillatory evolution persists. This allows us to provide valuable guidance to the theoretical efforts trying to model this unique accreting millisecond pulsar, and potentially help come to a better understanding of the interplay between the stellar magnetosphere and the influence of mass accretion.
5033	MONITORING ACCRETING MILLISECOND X-RAY PULSARS IN OUTBURST	PETER BULT	We propose a general purpose monitoring campaign of the next outburst of any AMXP, known or unknown. We request a total of 50 ks observing time to be spread over the typical 2 - 3 week duration of such an outburst, so that we can follow the properties of the pulsations as a function of flux. Additionally, this even sampling of the full outburst will also allow us to characterize the non-pulsating emission through a spectroscopic and timing study.

Prop #	Title	PI Name	Abstract
5035	NICER OBSERVATION OF X-RAY BRIGHT TIDAL DISRUPTION EVENTS	YUHAN YAO	We propose high-cadence NICER observations of two tidal disruption events (TDEs). First, we will test if features observed in stellar mass black holes (BHs) exist in massive BHs, such as the rapid evolution of disk temperature and power-law slope, quasi-periodic oscillations, and reverberation lags. For non-jetted TDEs, this program will confirm the scale (in)variance nature of the underlying physics governing the accretion onto stellar mass BHs and massive BHs. For relativistic TDEs, the observations will shed light on the power mechanism of TDE jets. Second, by combining NICER with contemporaneous UV/optical observations, we will study the interplay between the X-ray emitting disk and the reprocessed emission in the optical, and constrain the origin of the reprocessing layer.
5044	CORRELATED RADIO/MM-X-RAY TIMING OF CYGNUS X-1	THOMAS MACCARONE	We propose to observe Cygnus X-1 with NICER simultaneously with millimeter band observations. These data will provide a time lag for the mm emission from the X-ray emission, helping to understand the structure of the jet, following up on a previous result which indicates that either there is strong acceleration in the part of the jet from which the radio emission comes, or the size scale of the jet is not linearly proportional to the wavelength.
5051	NICER FOLLOW-UPS OF RARE AGN IGNITION AND SHUTDOWN EVENTS DETECTED WITH EROSITA	MIRKO KRUMPE	eROSITA, successfully launched in mid-2019, performs multiple all-sky X-ray surveys. By monitoring roughly half a million AGN, eROSITA identifies rare, accretion ignition/shut-down events as they occur. We request 5 ToOs each totalling 60 ks (2 ks roughly every day for 30 days) to explore how the X-ray coronae in AGN respond to a sudden, major change in accretion rate. The NICER data will also deliver the first medium signal-to-noise benchmark spectrum to which later spectra can be compared. They will reveal the evolution of the photon index, the possible intrinsic absorption, and the flux. This data set, combined with high-cadence optical monitoring, will give valuable insights into how accretion flows evolve during AGN ignitions/shut-downs.

Prop #	Title	PI Name	Abstract
5054	CATCHING X-RAY TRANSIENTS ON THE RISE WITH XB-NEWS AND NICER	JEROEN HOMAN	Observing campaigns of black hole and neutron star transients have long relied on triggers from X-ray all-sky monitors or wide-field cameras. However, due to the limited sensitivity of these instruments, the early rising phase of outbursts is typically missed. Here we propose a NICER monitoring program of known transient LMXBs that is triggered by detections of optical outburst activity with the Faulkes Telescopes/XB-NEWS. This allows us to catch transients as they emerge from quiescence in X-rays. With our program with aim to test the disk-instability model in LMXBs, follow the early X-ray spectral/ variability evolution of an outburst, and search for extended absorbing structures. We request monitoring campaigns for two transients, each with daily 2 ks observations for 20 days.
5055	USING NICER TO STUDY THE SOLAR-WIND INTERACTION WITH THE RARE, CO-RICH COMET C/2017 K2	DENNIS BODEWITS	We request 94 ksec of NICER observing time to study the solar-wind interaction of comet C/2017 K2 at 4 distinct epochs along its orbit. C/ 2017 K2 is a long-period comet on a highly eccentric orbit that will bring it to its first perihelion in December 2022. K2 is a particularly notable comet because it showed activity at a record-setting distance from the Sun on approach, suggesting a peculiar chemical composition, likely very rich in CO ice. We will test theoretical predictions of the effect of comet chemistry on charge-exchange emission spectra, study the spectral evolution of K2 as its activity evolves and is exposed to different solar wind conditions, and investigate the source of poorly understood cometary 1 -2 keV emission features.
5057	ORBITAL EVOLUTION OF ULTRACOMPACT WHITE DWARF BINARIES	TOD STROHMAYER	The ultracompact white dwarf systems HM Cnc and V407 Vul represent unique opportunities to probe binary evolution driven by gravitational radiation and mass transfer. NICER observations to date have provided new, precise frequency measurements in both systems, and the first measurement of an orbital frequency second derivative in an ultracompact binary. We propose observations of both sources to continue to extend their temporal baselines, enabling new, unique probes of their orbital evolution.

Prop #	Title	PI Name	Abstract
5059	PROBING THE X-RAY VARIABILITY IN GX 1+4 AND A SEARCH FOR COMPTON SHOULDER WITH NICER	PRAGATI PRADHAN	We request 30 2ks (total 60 ks) NICER snapshots - distributed any way as long as they are spaced out by more than a day - of the symbiotic LMXB GX 1+4 to (i) explore the NH and iron line variability at different intensity states and thereby understand the physical origin of these states. We will also (ii) measure the equivalent width of iron line with spin phase and probe any anisotropy in matter distribution around the pulsar. Finally, we will (iii) search for possible Compton recoil feature (to Fe kalpha line) in high NH states when the conditions are highly conducive for the formation of a Compton shoulder. Since our goals require frequent visits to the source with an instrument of large area and good spectral resolution, NICER is the only facility to make this possible.
5065	NICER CONSTRAINTS ON BLACK HOLE BINARY ACCRETION PHYSICS	RILEY CONNORS	A number of open questions persist in our understanding of the accretion flow properties of outbursting black hole binaries: principally the inner disk radius location, the disk density, iron abundance and inclination, and black hole spin. The superior spectral/timing resolution of NICER, and the high energy coverage provided by NuSTAR, present a golden opportunity to get constraints on these key quantities. We propose simultaneous NICER and NuSTAR ToO observations of any one of the 18 listed transient black hole X-ray binaries. We request a total of 8 ks of NICER time, split into four 2 ks exposures, each simultaneous with a 20 ks NuSTAR exposure (total of 80 ks NuSTAR time), to be spaced within a week of one another.
5067	IDENTIFYING NEWBORN COMPACT OBJECTS IN FAST, BLUE OPTICAL TRANSIENTS USING NICER'S SUPERIOR TIMING OBSERVATIONS	DHEERAJ PASHAM	NICER has recently identified a ~225 Hz quasi-periodic oscillation (QPO) from the fast, blue optical transient (FBOT) AT2018cow. This has been interpreted as a signature of fallback accretion onto a new born compact object in a supernova. Following this success we are proposing for high-cadence monitoring observations of a new FBOT in cycle 4. Our main goals are to 1) identify a similar QPO in a future FBOT, 2) search for coherent pulsations, and 3) study the evolution of such a signal with time, dependence on source luminosity and multi-wavelength properties. Identifying more such systems has the potential to open up a new area of science of study of compact objects right at birth. The key to this program is high time resolution in X-rays and currently only NICER has such a capability.

Prop #	Title	PI Name	Abstract
5069	FAST TRANSITIONS OF X-RAY VARIABILITY IN BLACK HOLE X-RAY BINARIES	LIANG ZHANG	Fast X-ray variability, e.g. quasi-periodic oscillations (QPOs), is a distinct characteristic of black hole X-ray binaries. Fast transitions between different types of QPOs or broadband noise are sometimes observed with significant spectral changes. The study of the fast transitions can provide important evidence on what triggers a QPO and on the physical origin of the QPO, which help us understand the mechanism responsible for the state transitions. NICER's superb time resolution and large effective area below 2 keV make it an ideal mission to study the fast transitions, especially on how the disk changes during the transitions. In this proposal, we ask for 120 ks NICER observations of next black hole candidate showing fast transitions to fully probe the spectral changes.
5070	TOO MONITORING OF A FUTURE STELLAR TIDAL DISRUPTION EVENT	DHEERAJ PASHAM	We propose ToO monitoring observations (2x300s per day for 200 d~120 ks) of a future stellar tidal disruption event (TDE). Our main goals are 1) to identify and study accretion states, transitions and accompanying corona formation around a supermassive black hole (SMBH) in a TDE. This follows NICER's recent success in doing so for the TDE AT2018fyk. 2) to search for the precession period of a newly formed accretion disk in soft X-rays to measure the SMBH spin. This is motivated by theoretical studies and NICER's detection of a 1.34 d quasi-periodicity in ASASSN-18EL: a changing-look AGN likely triggered by a TDE. Both our goals require excellent maneuverability, monitoring capability and a large soft X-ray effective area. At present, only NICER has all these capabilities.
5071	REGULAR MONITORING OF THE DRASTIC IRON-LINE PROFILE TRANSITION OF CIR X-1 AT THE PERIASTRON	MAYU TOMINAGA	Cir X-1 is the youngest known binary system in our Galaxy, hosting a neutron star. A NICER AO2 observation was carried out to cover the entire Cir X-1 orbit with 99 regular snapshots. Three iron emission/ absorption lines were observed near the periastron (phase=0) at 6.4 keV, 6.7 keV and 7.0 keV. In particular, the highly ionized Fe lines at 6.7 keV and 7.0 keV switched from emission to absorption between the orbital phases 0.93 and 0.96. We hope to clarify these line production mechanisms by studying orbit-by-orbit variation/stability of the emission/absorption line strengths and the transition phase. We concentrate on the orbital phase-period when the emission lines switch to the absorption lines (0.85-1.05) and propose to monitor this phase-period over the AO4 duration.

Prop #	Title	PI Name	Abstract
5074	ACCRETING MILLISECOND X-RAY PULSARS WAVEFORM MODELING AND THE EQUATION OF STATE OF NEUTRON STARS	ALESSANDRO PAPITTO	Modelling of the waveform of the X-ray pulsations of accreting ms pulsars (AMSP) is one of the most promising ways to constrain the equation of state of neutron stars. However, it requires an extremely high number of counts to break the degeneracy between the many parameters that shape the X-ray pulse profiles. The polarimetric information granted by the forthcoming IXPE mission will measure the geometry of the hot spots independently, easing the requirement. We propose a 350 ks NICER ToO observation of the next outburst of an AMSP to measure the pulsar ephemeris and fold simultaneous IXPE data and derive a high statistics energy-resolved pulse profile. The proposed observation will measure the mass and the radius with an accuracy of a few per cent.
5075	RAPID OPTICAL AND X-RAY TIMING OBSERVATIONS OF NEUTRON STAR XRBS WITH OPTICAM AND NICER	ANGEL CASTRO	High-speed, multi-wavelength observations are essential to understand the underlying physics of the accretion process in the sub-second range in XRBs exhibiting short periods of X-ray and optical activity called outbursts. To study the causes of these sudden outbursts, the variability scales in the different wavelengths and the changes in the geometry of the emitting zone, we propose anticipated observations of 6 outbursts with NICER, strictly simultaneous with optical ground-based follow-up. We will make extensive use of the new OPTICAM triple-band optical instrument that already has 14 nights of guaranteed observation time during the period coinciding with AO4. Observations will also be made with optical telescopes to which our team have access.
5076	MAGNETAR OUTBURSTS AS A CLUE FOR UNDERSTANDING MAGNETIC ENERGY DISSIPATION AND FAST RADIO BURSTS	TERUAKI ENOTO	Magnetar X-ray outburst is sporadic dissipation of magnetic energy via short bursts, giant flares, and persistent emission enhancement. The physics underlying this process is still an open question. Follow-up NICER observations of transient magnetars have provided clues for this question, as shown by recent successful NICER ToO programs: the radio-loud XTE J1810-197, the Galactic fast radio burst (FRB) source SGR 1935+2154, high-B pulsar / magnetar Swift J1818.0-1607, a new source SGR 1830-0645, and the long-term active Swift J1555.2-5402. Prompt X-ray observation is becoming more and more critical after discovering the FRBs from the Galactic magnetar SGR~1935+2154 in 2020. Here we propose NICER ToO observations of magnetar outbursts in soft X-rays.

Prop #	Title	PI Name	Abstract
5078	NOVAE IN OUTBURST AS SUPERSOFT X-RAY SOURCES	MARINA ORIO	We ask to monitor the next two luminous classical or recurrent novae in outburst. The eruptions occur on shell burning white dwarfs undergoing a thermonuclear runaway; after the initial flash and a following radiation pressure driven wind, the white dwarf's atmosphere shrinks to almost pre-eruption radius with a very thin layer above the burning shell, reaching extremely high effective temperature - up to a million K. The white dwarf is observed directly as a luminous supersoft X-ray source (SSS). NICER is ideal to study the SSS, because of its response in the soft range and timing capabilities. Several novae in the SSS phase, as well as permanently burning SSS, also show puzzling modulations with periods around a minute, and NICER is extremely useful in their investigation.
5079	FOLLOWING A NEW MAGNETAR OUTBURST WITH NICER AND NUSTAR	ALICE BORGHESE	Isolated neutron stars powered by the instabilities and decay of their huge magnetic field, magnetars are characterized by a distinctive high-energy flaring phenomenology: short bursts of X-/gamma-rays, often accompanied by enhancements of the persistent X-ray luminosity, referred to as outbursts. Magnetar-like activity was discovered from isolated neutron stars with a broad range of magnetic field strengths. Moreover, the recent detection of a FRB-like burst from a Galactic magnetar has strengthened the belief that at least a sub-group of FRBs can be powered by magnetars. Here, we propose to follow two new outbursts from a known or a new source with NICER and NuSTAR to gather new physical insights on magnetar surface, field configuration and magnetosphere.
5083	IS THE MAGNETAR IN WESTERLUND 1 A LOW-B MAGNETAR?	ALICE BORGHESE	After two major outbursts in 2006 and 2011, CXOU J164710.2-455216 entered a multi-outburst phase in 2017 May, during which three flux enhancements were registered. The latest occurred in 2018 February and since then, the source flux is slowly decaying towards the quiescent level. An intensive multi-instrumental campaign found that the magnetar rotational properties had changed following the latest bursting event, adding J1647 to the small group of low-B magnetars. With the monitoring campaign proposed here, we will be able to infer the dipolar magnetic field strength during a non-active state and to test the untwisting-bundle scenario for magnetar outbursts.

Prop #	Title	PI Name	Abstract
5087	NICER FOLLOW-UP OF AN EXTREME NUCLEAR TRANSIENT	ERIN KARA	X-ray observations of extreme accretion episodes provide a unique probe of the physics feedback from supermassive black holes. Whether due to some unknown disc instability, a stellar tidal disruption event or an encounter with an orbiting low mass compact object, such events change the accretion flow over timescales of weeks to months. X-rays are an essential part in understanding these extreme accretion episodes since they probe the regions closest to the black hole. NICER, in particular, is ideally suited for X-ray follow-up because it has flexible scheduling, a large effective area, good spectral resolution and lack of pile-up. We request to follow-up one bright extreme nuclear transient event for 150~days every 3~days for 1.5~ks (for a total of 75ks).
5091	CAPTURING QUASI-PERIODIC OUTFLOWS FROM A FUTURE AGN OUTBURST	DHEERAJ PASHAM	NICER has recently identified Ultrafast outflows (UFOs) with an enigmatic quasi-periodic variability of 8.5 days during an AGN outburst. The physical origin of these quasi-periodic outflows is unclear but time-resolved X-ray spectral analysis suggests that they are driven by quasi-periodic changes in the UFO's absorption. Motivated by the discovery of this new AGN phenomenon, we propose NICER monitoring (2x500 s for 150 days) of a future AGN outburst with an outflow. Our primary goal is to expand on the pilot study and build a sample to understand the frequency and duty cycle of such events. A large collecting area, good spectral resolution and the ability to monitor for months is necessary to achieve our science goal. As a result NICER is the only facility that can carry out this study.
5093	MONITORING MAGNETARS WITH NICER	GEORGE YOUNES	Magnetars are young highly-magnetized isolated neutron stars with emission peaking in the X-ray band. The decay of their super-strong magnetic fields fuels their high energy radiation. Here, we propose a yearly monitoring program of six magnetars with NICER to establish their spectral and phase-coherent timing properties. Such a campaign will refine our understanding of these unique sources by discovering new glitches and revealing their relative strengths and recovery times, identifying new spin-down glitch events, and revealing magnetars burst and outburst activity. In the process, we will also refine our knowledge on magnetars variability and the correlations between the spectral and temporal properties in quiescence and in outburst.

Prop #	Title	PI Name	Abstract
5094	CHARACTERIZING X-RAY EMISSION OF A WHITE DWARF PULSAR CANDIDATE DISCOVERED IN THE ZTF OPTICAL SURVEY	KAYA MORI	We propose to observe a white dwarf (WD) pulsar candidate ZTF J185139.81+171430.3 with NICER and NuSTAR. The first WD pulsar system, AR Sco, is one of the rare astrophysical manifestations on how a magnetically interacting binary system can accelerate particles in the magnetosphere and generate broad-band non-thermal synchrotron radiation from radio to X-ray band. ZTF observations revealed a 12.37-minute highly-modulated, coherent periodicity from our target. This is a unique feature previously detected from AR Sco. Alternatively, the source could be an AM CVn star or an accreting intermediate polar with unusually high optical modulation. The proposed NICER + NuSTAR observations will explore the nature of this peculiar CV by investigating its X-ray spectral and timing properties.
5096	TRACKING THE HIGHLY VARIABLE X-RAY OBSCURER IN MRK 817 WITH NICER	EDWARD CACKETT	Knowledge of the structure and kinematics of gas around supermassive black holes is vital to understanding accretion and thus AGN feedback. To this end, Mrk 817 is currently the subject of an ambitious 15-month multi-observatory intensive disk reverberation mapping campaign. However, both UV and X-ray observations have revealed the presence of new obscuration that displays dramatic variability. NICER monitoring has been key to tracking the changes in the X-ray obscurer. Optical monitoring of Mrk 817 will continue during NICER Cycle 4, and we propose for NICER monitoring with a 2-day cadence in order to continue to track the variability of this obscuring gas and, combining with longer wavelength data, to better understand its nature and location.
5097	NICER TOO OBSERVATIONS OF SWIFT/XRT DEEP GALACTIC PLANE SURVEY (DGPS) SOURCES	CHRYSSA KOUVELIOTOU	We propose a ToO follow up program linked to the ongoing Swift/XRT Deep Galactic Plane Survey. Phase-I covered 10 deg<|l|<30 deg and|b| >0.5 deg and has detected ~300 sources, of which 150 are new/ unclassified transients. Phase-II is covering 30 deg<|l|<50 deg and |b| >0.5 deg, which similarly to Phase-I, aims at mapping X-ray sources with good depth and coverage to enable source identification and multi-wavelength followups. Source identification strongly depends on timing and spectral information to accurately measure time variability and X-ray flux. NICER observations are, therefore, pivotal in source classification. We request 5 ToOs, 10 ks each (total of 50ks), of new sources found in Phase-II observations, which will be provided to us through private consultation.

Prop #	Title	PI Name	Abstract
5099	LF-QPOS IN BH-LMXBS: EXPLORING THE ROLE OF COMPTONISATION WITH NICER AND NUSTAR	FEDERICO GARCIA	BH LMXBs show prominent low-frequency QPOs in their power-density spectra, with fractional amplitudes that increase with energy and complex lag spectra. The question about their physical origin remains unanswered. Quasi-simultaneous observations with NICER and NuSTAR in the soft and hard X-ray bands will allow us to probe the radiative mechanism that modulates the energy-dependent timing properties of these LF QPOs. This information is crucial to unveil the physical mechanism that produces these QPOs, both dynamically, either connected to Lense-Thirring Precession or through instabilities in the hot accretion flow, and radiatively, via Compton amplification in the corona where the observed spectral-timing properties are imprinted onto the X-ray emission.
5104	INVESTIGATING THE ACCRETION-EJECTION INTERPLAY IN THE NS X-RAY BINARY 4U 1820-30 WITH NICER	ALESSIO MARINO	The persistent neutron star X-ray binary 4U 1820-30 displays a 170 d accretion cycle, evolving between phases of high and low X-ray luminosity. Over this cycle, dramatic changes are observed in both the X-ray spectral-timing properties (related to the accretion flow) and the radio spectral shape (related to the jet). Interestingly, the jet evolution seems to be triggered by the accretion rate rather than the spectral state. The aim of the proposal is to progressively track the spectral and timing evolution of the accretion flow over a cycle with a NICER+NuSTAR monitoring campaign. 9 NICER observations of 10 ks each, 3 of them paired with 20 ks NuSTAR visits, are requested. This campaign will be coupled with radio and IR observations to trace the accretion/ejection coupling mechanism.
5105	THE ORIGIN OF SUB-SECOND MULTIWAVELENGTH VARIABILITY IN BLACK HOLE BINARIES	JOHN PAICE	Over the past few years, successful multiwavelength campaigns on a handful of Galactic Black Hole (BH) X-ray Binaries have revealed remarkable sub-second variability and significant optical/infrared-vs-X-ray correlations, with some arising in the first acceleration zone at the base of a compact, relativistic jet. But what drives these variations, and are they really as stable as they sometimes appear? Here we propose up to 10 individual anticipated ToO observations on 1--2 hard state outbursts, strictly simultaneous with optical/infrared timing. We will probe rapid, sub-second photometric variations and search for inter-band time delays to disentangle the jet/disc/coronal components using spectral-timing, and probe these systems on theory-critical, unprecedented scales.

Prop #	Title	PI Name	Abstract
5106	NICER AND NUSTAR FOLLOW-UP OBSERVATIONS OF GAMMA-RAY FLARING BLAZARS	FILIPPO D'AMMANDO	There are many open questions related to the nature of the high-energy emission and the physics of jets which need to be addressed, such as the radiative processes producing the high-energy emission, the parameters of the emitting region(s) and the jet composition. Radiative models need to be tested against MWL simultaneous SED. We propose to trigger 1 ToO observation with NICER and NuSTAR if gamma-ray flaring activity from a blazar is detected by Fermi-LAT and a high X-ray flux has been confirmed by a rapid Swift follow-up observation. The goal is the study of the broadband SED and MWL light curves for putting constraints on the physics of relativistic jets from super-massive black holes, and on the acceleration and radiation mechanisms at work in such extreme environments.
5107	MEASURING HMXB WINDS WITH NICER OBSERVATIONS OF CYG X-1 NEAR ORBITAL PHASE 0	MICHAEL NOWAK	Cyg X-1 is in a 5.6 day orbit around a High Mass X-ray Binary that donates mass to the black hole system via ``focused wind accretion''. Near orbital phase 0, or line of sight to the inner accretion flow passes through this wind, and allows X-rays from the black hole to probe the wind's structure. Historically, we see ``dips'' associated with both highly ionized absorption and colder, denser near neutral absorption. NICER, with its large effective area, superb soft X-ray response, and low background is uniquely suited to study this dipping behavior on time scales potentially as fast as 0.1 s. We will use modeling of light curves, time-dependent color-color diagrams, and spectra at different color/flux levels.
5108	NICER CHARACTERISATION OF OUTBURST REFLARES IN LMXBS	ARIANNA ALBAYATI	Reflaring events have been seen to occur after the outbursts of LMXBs. They are several orders of magnitude fainter than the main outburst, and each last from a few days to up to two months. These reflares are observed only for some sources and, in the same source, only for some outbursts. NICER has recently allowed for the first detailed spectral studies of reflares, uncovering full state transitions which exhibit hysteresis loops, one of which was in an unusual clockwise direction. However, the cause of reflaring, and why there is such variety in their manifestation, is still unknown. To explore this, we propose to observe the next source which shows reflares at the end of the outburst every other day for a total of 120 ksec with NICER to follow the reflare's evolution.

Prop #	Title	PI Name	Abstract
5111	NEUTRON STARS MULTI-WAVELENGTH FAST VARIABILITY: PROBING DISK-JET CONNECTION	FEDERICO VINCENTELLI	Simultaneous X-ray/optical-infrared observations of black hole X-ray binaries have shown to be one of the best ways to probe the jet in its innermost regions. Nonetheless neutron star X-ray binaries, which are clearly dominated by the jet at IR wavelength, have almost never been studied with this approach. Here we propose to observe with NICER the Neutron Star Low Mass X-ray binary 4U 0614+091 simultaneously with already approved fast IR HAWK-I@VLT observations. We ask to perform a 8 ks observation. This data will allow to study the disk-jet interaction in accreting neutron stars in great detail, as already done extensively in black-hole X-ray binaries.
5114	TRACKING THE EVOLUTION OF X-RAY QUASI-PERIODIC ERUPTIONS FROM A QUIESCENT GALAXY	RICCARDO ARCODIA	Quasi-Periodic Eruptions (QPEs) are extreme soft X-ray bursts of unknown nature recurring on the timescale of hours. So far only four such sources have been found. One of these, eRO-QPE1, can only be monitored with NICER. We want to know i) if QPEs are still ongoing and if the period has changed since discovery, ii) if there is evidence of a decrease, resonances and/or possible modulations, iii) the physical cause of these bursts. To achieve this, we ask for 4 sets of observations, each with a baseline of 7 days with 14 visits per days, each visit with exposure of 250s (for a total of 98ks).
5115	MONITORING THE VARIABILITY OF "QUIESCENT" SWIFT-BAT BLAZARS WITH NICER	SERGIO MUNDO	A recent 5-month NICER monitoring campaign of 4 "quiescent" Swift-BAT blazars reveals that variations in the 0.3-2 keV band are detected on three distinct timescales, but that the fractional variability is <25% and decreases on longer timescales, implying low-amplitude variability for all sources and showing very little to no variability on monthly timescales, which is in stark contrast to previous studies that show that blazars are highly variable in the X-rays over a wide range of timescales. As a follow-up to this campaign, we propose multi-cycle NICER observations of these 4 BAT blazars as well as of 2 additional blazars whose variability is not detected by the BAT, in order to characterize the long-term variability, search for flares, and obtain high-quality time-averaged spectra.

Prop #	Title	PI Name	Abstract
5117	A COHERENT TIMING SOLUTION FOR THE "MAGNIFICENT SEVEN" ISOLATED NEUTRON STAR RBS 1774	ADRIANA MANCINI PIRES	Among thermally emitting isolated neutron stars, RBS 1774 appears particularly hot in X-rays and strongly magnetised. Recent XMM-Newton and eROSITA observations reveal unexpected variations in its timing behaviour (a decrease in pulsed fraction and higher spin down), as well as evidence of multiple absorption lines and a cooler thermal component. We propose coordinated NICER observations to derive a precise timing solution and perform phase-resolved spectroscopy. These will allow us to determine the high value of spin down hinted by analysis of existing data, which places the source closer to a magnetar than any other M7 INS. The NICER campaign will likewise provide invaluable information on the geometry and orientation of the emitting region and spin-dependence of the spectral features.
5118	RELATIVISTIC REFLECTION AND REVERBERATION MAPPING IN A BLACK HOLE BINARY	JINGYI WANG	Black hole astrophysics can be regarded as a fundamental tool in studying the accretion and ejection physics in the strongest gravity regime in the Universe. Reflection spectroscopy studies the time-averaged flux-energy spectrum, providing constraints on properties in the accretion disk and the corona, but degeneracies take place in problems such as the truncation level of the disk. Reverberation mapping is a timing technique revealing the disk-corona geometry in the innermost regions, which could help break degeneracies. With recent cutting-edge developments in physical spectral-timing models, the main goal in this proposal is to find clues on the state transition mechanism, and the coupling between the disk, corona and jet in black hole binaries.
5126	MONITORING THE EVOLUTION OF NASCENT ACCRETION DISCS FORMED IN TIDAL DISRUPTION EVENTS	ADAM MALYALI	During its ongoing all sky survey, SRG/eROSITA is rapidly detecting a large number of Tidal Disruption Events (TDEs), identified through their ultra-soft, large amplitude flares from previously quiescent galaxies. We request NICER monitoring of 6 X-ray bright TDEs to be discovered by eROSITA in Cycle 4. The NICER data will be used to: i) search for quasi-periodic modulations in these X-ray light curves from precessing nascent accretion discs, ii) characterise the X-ray variability of TDEs over short and longer timescales after the initial eROSITA detection.

Prop #	Title	PI Name	Abstract
5130	THE UNUSUALLY SLOW FREQUENCY CHANGE OF RXJ0806.4-4123	GEORGE PAVLOV	A NICER timing campaign of 2019-2021 on the isolated neutron star RX J0806.4-4123 showed that its frequency derivative is unusually small. It is in fact so small that there still is the possibility for its positive as well as negative values despite the tight NICER constraints on the timing solution. The proposed additional observation will reduce the uncertainty of the frequency derivative by a factor of five. This can answer the question whether RX J0806.4-4123 spins down or up. The spin-up could be due to accretion from a fallback disk while a very slow spin-down would mean an unexpectedly low spin-down power of this isolated neutron star.
5131	THE OBSCURED STATE OF GRS 1915+105	JOSEPH NEILSEN	GRS 1915+105 is a black hole binary known for its unique variability, strong winds, jets, and BH spin. After 20+ years in outburst, NICER detected a huge change in this iconic source: the X-ray flux dropped by 100x! Spectra suggest a large obscuring shroud, but what is this obscuring gas? The "obscured" state is highly variable, with flares that reveal strong winds and highly-ionized absorption. We propose to study its long-term evolution with 35 weekly exposures of 2.7 ks in Cycle 4. NICER is the only mission capable of frequently monitoring this important new state. We also request a 25 ks NuSTAR ToO to constrain scattering and wind photoionziation. These observations will also grow a NICER legacy archive of obscured variability in GRS 1915+105.
5133	NICER+FAST SIMULTANEOUS TOO OBSERVATIONS OF THE REPEATING FAST RADIO BURSTS 121102 AND 180301.	SIBASISH LAHA	The fast radio bursts (FRBs) are milli-second duration radio transients, the origin of which is still unknown. Possible mechanisms that could generate these highly coherent radio emission from FRBs involve a) neutron star magnetospheres and/or b) relativistic shocks far from the central energy of the source. Polarization signatures in radio band can distinguish between the two scenarios. Detection of emission in X-rays (with a measure/limits on the efficiency $\eta ~E_{Radio}/E_{X-ray}$) are therefore crucial to establish/confirm if indeed the emission mechanisms are the same as those predicted by radio polarization angle measurements. We propose to observe the sources FRB~180301 and FRB~121102 each with a total exposure of $\sim 50\ks$ with NICER+FAST during their bursting-phases.

Prop #	Title	PI Name	Abstract
5134	LEGACY OBSERVATIONS OF ACCRETION DISK WINDS IN BHXRBS	NOEL CASTRO SEGURA	BHXRB viewed at high inclinations display wind signatures in their X-ray spectra. These features are the signatures of powerful, hot and equatorial accretion disk winds being driven from these systems in their luminous soft states. Remarkably, blue-shifted absorption lines have recently also been discovered in optical and NIR recombination lines. These features must also be produced in an outflow, but the physical conditions traced by these outflows are different. It is unclear if they are associated with driven by different mechanisms or simply with different regions/phases within the same outflow. We propose to answer this question by carrying out simultaneous time-resolved spectroscopy of the next black-hole transient in the X-ray and optical bands, throughout a full outburst.
5135	DEFINING THE VARIABLE X-RAY SPECTRUM OF GAMMA2 VEL, THE NEAREST WC-BINARY	MICHAEL CORCORAN	We propose monitoring observations of of the nearest WC+O binary, Gamma2 Vel with NICER around 2 orbits during AO4. This will provide the best measure ever obtained of the change in flux, emission measures, temperatures and column densities as the X-ray emitting shock recovers from periastron passage. The derived variations in column density, temperature and X-ray flux will be compared to simulated data from detailed hydrodynamic models to constrain the shock structure in 3-D. We will also propose for ground-based monitoring of the C~III 5696 emission line and other emission lines. We will compare X-ray and available optical spectra variations to WR~140 and other WC+O binary stars to explore shock cooling and differences in dust formation from Gamma2 Vel and other WC+O binaries.
5136	CATCH THE NEXT OUTBURST: NICER FOLLOW-UP OF THE CHANGING-LOOK AGN MRK 1018	ROISIN BROGAN	Mrk 1018 is one of only two changing-look AGN ever observed to change type twice. The AGN was discovered mid-transition and has a rich range of multi-wavelength data available, primarily covering the faint 1.9 type state. During this faint state it changes its energy output unpredictably. In 2020, an outburst so large that it could be regarded as a changing-look event by itself was observed. We request that a ToO monitoring program over 6 months be put in place. This will track the evolution of the X-ray flux during outburst and provide four spectral X-ray snapshots to compare spectral parameters with the faint phase. The optical monitoring program will also be increased to a similar cadence for a unique multi-wavelength picture of the response to drastic accretion changes.

Prop #	Title	PI Name	Abstract
5139	A SEARCH FOR PULSATIONS FROM NEW CANDIDATE ISOLATED NEUTRON STARS	MEGAN DECESAR	The ROSAT All-Sky Survey discovered the Magnificent 7 (M7), seven slowly-rotating, highly magnetized X-ray dim isolated neutron stars (XDINS) with thermal X-ray emission. All but one of the M7 have pulsed emission, with quasi-sinuosoidal light curves and pulsed fractions between 1.5-18 percent. Their nearly-pure thermal spectra, along with absorption features detected in most of the M7, provide a mechanism to probe their atmospheric composition and magnetic and emission geometries. The thermal emission also provides a unique probe of the neutron star equation of state. Four new M7-like XDINS candidates were recently identified in the 4XMM Data Release 10 (4XMM-DR10). We propose to search for X-ray pulsations in the brightest two of these sources.
5140	MEASURING BLACK HOLE SPIN AND MASS THROUGH X-RAY REFLECTION SPECTRA AND REVERBERATION LAGS	GUGLIELMO MASTROSERIO	X-ray reflection in accreting black holes probes the inner region of the accretion disc, and proper modelling of the spectral and timing properties of this emission enables measurement of the black hole mass and spin. The unique combination of NICER s soft and NuSTAR's hard coverage provide the broad bandpass, high count rates and energy and timing resolution required to constrain models of the time averaged energy spectrum and the reverberation lag energy spectrum on different timescales. We propose to observe any black hole transient, known or unknown, exceeding 30 mCrab during the bright hard state for 30 ks with simultaneous NICER and NuSTAR observation in order to access unprecedented characterisation of black hole spin and mass.
5141	SEARCHING FOR CLOSE SUPERMASSIVE BLACK HOLE BINARIES WITH EROSITA, NICER, AND XMM-NEWTON	MIRKO KRUMPE	eROSITA is performing multiple all-sky X-ray surveys and monitoring almost half a million AGN every six months. It has the capability to identify exceptional AGN with periodic X-ray flux signals. These objects are potential supermassive black hole binaries (SMBHB). We request ToO monitoring campaigns for up to three eROSITA-selected candidate periodic AGN. Each ToO consists of six individual pointings, 10 ks each, spaced roughly four weeks apart. The campaigns are needed to track the flux modulation waveform on a monthly time-scale, accurately determine the period, and to determine the details of follow-up observations to confirm the binary nature. The most convincing case will be the target of a pre-approved 100 ks XMM-Newton observation.

Prop #	Title	PI Name	Abstract
5146	CONSTRAINING THE X-RAY VARIABILITY PROPERTIES OF THE QUIESCENT BLACK HOLE V404 CYG	MARK REYNOLDS	The quiescent state is the dominant accretion mode for black holes on all mass scales. Our knowledge of the nature of the quiescent accretion flow is limited due to the characteristic low luminosity in this state. Here, we propose 100 ks of \textit{NICER} monitoring observations of the quiescent stellar mass black hole V404 Cyg. These observations will allow us to characterize the quiescent accretion flow variability (spectral \& timing) at the viscous timescale, associated with the optically thick disc/ADAF interaction region, around a stellar mass black hole.
5147	NICER STUDIES OF AGN CLOUD OCCULTATION EVENTS DETECTED WITH EROSITA	MIRKO KRUMPE	Understanding the sub-structure of the torus in AGN is requisite for understanding the radiative and mechanical processes occurring in AGN central engines, and recent works point to tori composed of clumps. eROSITA is currently performing multiple all-sky X-ray surveys, including monitoring the brightest ~80 AGN for spectral changes, though 2023. eROSITA is thus in a position to detect rare transits of torus clouds across the line of sight. For up to 2 objects, we request ToO campaigns consisting of 7 visits each, with each visit 10 ks (total request of 140 ks), to systematically trace the smoothness of torus clumps and illuminate the sub-structure of clumpy tori in AGN.
5152	THE RISING OF WR 140	MICHAEL CORCORAN	Eccentric, massive colliding wind binaries are laboratories to study collisionless shocks in astrophysical settings. The best example of such a shock laboratory is WR 140, where wind-wind interactions generate variable emission from the X-ray to radio bands including dust formation. NICER monitoring will allow use to sensitively measure the physical changes of the hot shocked gas and fill in an important gap in the variation of column density. NICER provides the best measure of the colliding wind X-ray spectrum free of systematic uncertainties which occur when comparing data from different instruments. We propose to extend the NICER observations of WR 1140 with weekly monitoring through Cycle 4 as the X-ray emission begins to increase towards periastron passage in 2024.

Prop #	Title	PI Name	Abstract
5158	X-RAY AND RADIO SIMULTANEOUS MONITORING CAMPAIGN OFNEARBY REPEATING FAST RADIO BURSTS IN THE SOUTHERN HEMISPHERE	TERUAKI ENOTO	The origin of fast radio bursts (FRBs) remains mysterious. The most plausible candidate is the magnetospheric phenomenology of neutron stars, but this still includes multiple scenarios, involving magnetar bursts that release magnetic energy and giant radio pulses that originate from rotational energy. In any plausible scenario for FRBs, the energy emitted incoherently at high energies is orders of magnitude larger than the radio; thus X-ray measurements offer one of the strongest constraints on the FRB engine. Here we propose simultaneous radio and X-ray observations of nearby extragalactic repeating fast radio bursts (FRBs) in which radio bursting activities are confirmed within 10 Mpc in the southern hemisphere.
5160	COORDINATED MONITORING OF NGC 4051 BY NICER AND TESS TO TEST THE X-RAY REPROCESSING PARADIGM	MICHAEL FAUSNAUGH	Recent measurement of AGN accretion disk sizes rely on the interpretation of UV/optical continuum time delays as light-travel times, which assumes that X-ray variations drive the UV/optical variations. This "X-ray reprocessing" model requires that X-ray heating of the accretion disk produces an X-ray reflection spectrum that is closely correlated with the UV/optical variations. We propose testing this model by searching for correlations of the X-ray reflection spectra in NGC 4051 with optical variations. We will use NICER to produce a time series of high SNR X-ray reflection spectra that are concurrent with a nearly continuous TESS light curve. Correlated variations wills strongly support the X-ray reprocessing paradigm, and a lack of correlation will constrain alternative models.
5161	TIME-RESOLVED SPECTROSCOPIC AND POLARIMETRIC STUDIES OF 4U 1626-67 WITH NICER AND IXPE	MASON NG	4U 1626-67 is an unusual low-mass ultracompact X-ray binary with a ~42 minute orbital period which hosts a ~7.7 s pulsar with a strong magnetic field of B ~ 3e12 G. It has exhibited two episodes of torque reversals in 1990 and 2008, and it is currently in the sustained spin-up state. We propose a 40 ks observation, quasi-simultaneous with the Imaging X-ray Polarimetry Explorer (IXPE), slated for launch on 12/09/2021. Joint NICER and IXPE observations will provide us with a level of unprecedented synergy that will enable accurate spectropolarimetric analysis designed to constrain the emission region geometry, to discern the distinct behavior between the spin-up and spin-down states, and to understand the flaring behavior that occurs only in the spin-up state.

Prop #	Title	PI Name	Abstract
5165	CONTINUUM-FITTING SPIN MEASUREMENTS OF BRIGHT BLACK-HOLE TRANSIENTS	JAMES STEINER	Stellar-mass black holes in X-ray transients undergo months-long outbursts during which they explore wide-ranging accretion rates and spectral-timing states. Following transitioning to the thermal/soft state, the black hole undergoes a protracted thermal decline. The pristine thermal/soft state contains only minor contribution from the nonthermal components; most of the emission comes from the thermal accretion disk continuum. Accordingly, this state is the gold-standard for spin measurements via X-ray continuum fitting. We request 10x2ks observations during the thermal phase of the outburst, to monitor a bright black-hole transient in decline, in order to determine its spin. We request up to two triggers over the next cycle, for a maximum of 40ks.
5167	SOFT X-RAY EXCESS VARIABILITY IN THE REPEAT-FLARING CLAGN MRK 590	DANIEL LAWTHER	The changing-look AGN Mrk 590 lost its soft X-ray excess as it transitioned to Type 2 around 2010. After partial re-ignition in 2017, it is now in a repeated (and possibly quasi-periodic) X-ray and UV flaring state, with an accretion rate `flickering' near the threshold to sustain a geometrically thin, thermal disk. Here, we ask to use the excellent soft X-ray sensitivity of NICER to monitor its X-ray luminosity variations, and in particular the variability of the soft X-ray excess component, during these flares. This will test the warm-Comptonization model for soft excess, providing a high dynamic range in UV and X-ray luminosities. The observations also provide X-ray SED monitoring to support a broad-scoped, multi-wavelength investigation of the current flaring activity.
5170	STUDYING THE PERSISTENT DISK WIND IN GX 13+1	JEROEN HOMAN	We propose a NICER monitoring campaign of the luminous neutron-star LMXB GX 13+1, with the aim of studying how the persistent disk wind in this source changes with variations in the mass accretion rate. Due to the high inclination of the source the latter is difficult to measure directly. Instead we will use changes in the hardness-intensity tracks as a proxy for changes in the accretion rate. We request four sets of 4 x 4 ks observations (64 ks total) to achieve this goal. The individual NICER exposures are long enough to accurately track changes in the density and ionization of the disk wind.

Prop #	Title	PI Name	Abstract
5171	A STUDY OF M DWARF FLARES USING SIMULTANEOUS MULTI-WAVELENGTH DATA	RISHI PAUDEL	We propose to obtain NICER X-ray data of four nearby active mid-M dwarfs simultaneously with the Atacama Large Millimeter Array radio and the Neil Gehrels Swift Observatory UV data. These stars are spectral analogues of another flaring mid-M dwarf with a planetary system - Proxima Cen - and span a wider range of ages and activity levels. Such data will enable us a) understand the physical mechanism associated with M dwarf flares, b) examine if the correlation between millimeter and UV emission found in a previous study of Proxima Cen flare extends into X-ray wavelength and is a universal property of mid-M dwarfs regardless of age and activity level. Our results will be significant inputs to models that estimate the impacts of strong flares on the atmospheres of planets orbiting M dwarfs.
5172	THE PROPERTIES AND EVOLUTION OF ACCRETION DISKS IN BLACK HOLE BINARIES	JAVIER GARCIA	We request 10ks of NICER and 100ks of NuSTAR time to trigger Target of Opportunity (ToO) observations of a new or known black hole transient during the end of the outburst, after the source has entered the low-hard state. We aim to obtain high signal-to-noise data during this fainter phase in order to measure the level of disk truncation using X-ray reflection spectroscopy. We will also provide measurements for the disk inclination, ionization and iron abundance. These observations will provide crucial constraints to support a large-scale data analysis program for these sources.
5175	NICER MONITORING OF ETA CARINAE X-RAY EMISSION CYCLE 4: FROM APASTRON TO APASTRON WITH NICER.	DAVID ESPINOZA-GALEAS	We request 52 ksec of observation time in NICER AO4 to continue monitoring the X- ray emission from the massive colliding wind binary Eta Carinae (η Car). NICER started to observe η Car s X-ray emission as part of NICER Observatory Science Program and continued in cycles AO1, AO2, and AO3. If accepted the NICER AO4 will complete a whole cycle from apastron to apastron (∼5.54 years) of monitoring program. The NICER AO4 will cover η Car s orbital phases between ∼4.37 and ∼4.55 providing time-resolved spectrometry of η Car s at apastron. Flux observations from NICER AO4, together with observations from NICER AO3, will be compared with RXTE observations at the same orbital phases to show changes in the mass loss of the stars.

Prop #	Title	PI Name	Abstract
5176	X-RAY REVERBERATION IN BILLION MASS BLACK HOLES	VENKATESSH RAMAKRISHNAN	The Event Horizon Telescope (EHT) observations of the supermassive black hole (SMBH) in M87, has provided a powerful experimental testbed for strong gravity. Hence the SMBHs in several nearby systems, including the SgrA*, are all potential candidates to enhance our understanding of gravitation in such extreme environments. However, providing strong constraints on several aspects of the accretion and jet physics in active galaxies that are possible through multiwavelength observations, is vital for the convergence of theoretical simulations of accretion processes. We thus propose a NICER monitoring campaign of three nearby galaxies, probing for the orbital variability time-scale. Besides, we also seek to address the role of the magnetic field based on the turbulence of the light curves.