

25 Years of Science with Chandra



Science Program

Welcome to the 25 Years of Science with Chandra Symposium

Food events and
poster displays
will be in the
Silver Ballroom

Talks and presentations
will be in
Liberty Hall

All conference attendees
are required to follow
the Code of Conduct





Block Schedule

All talks will be held in Liberty Hall
 Coffee breaks, poster sessions,
 lunches, receptions, and the banquet
 are in the Silver Ballroom

Monday, Dec 2

Welcome Reception 18:00
 Light Refreshments in the Silver Ballroom

Tuesday, Dec 3

Welcome SOC Chairs 9:00
Opening Remarks 9:05
 CXC Director and Past Director
Remarks by Dr. Daniel Evans 9:10
 Dir. of Civil Space Policy, Nat. Space Council
Session: Galaxies, their ISM, 9:15
 and XRB Populations
Coffee Break and Poster Viewing 10:30
Session: Stellar Properties 11:00
 and Environment
Lunch 12:30
Chandra - The Early Years 13:30
 Harvey Tananbaum & Martin C. Weisskopf
Q&A Session 14:30
HRC Award Ceremony 14:45
Coffee Break and Poster Viewing 15:00
Astronaut Session: 15:30
 The Launch of STS-93 &
 the Deployment of the
 Chandra X-ray Observatory
Evening with the Astronauts 17:00
 Reception and Appetizers in the Silver Ballroom

Wednesday, Dec 4

Session: Clusters and 9:00
 Cosmological Parameters
Coffee Break and Poster Viewing 10:30
Remarks by Dr. Ellen Stofan 11:00
 Under Secretary for Science and Research, SI
Session: Solar System and 11:10
 Exoplanetary Systems
Lunch 12:40
Session: Stellar Remnants 13:30
 and Compact Objects
Coffee Break and Poster Viewing 15:00
Session: Sub-Arcsecond 15:30
 Resolution in X-ray Astronomy

Thursday, Dec 5

Session: Chandra Synergies with 9:00
 Multi-wavelength Facilities
Coffee Break and Poster Viewing 10:30
Session: X-ray Binaries 11:00
Lunch 12:30
Session: Sky Surveys and the 13:30
 Chandra Source Catalog
Coffee Break and Poster Viewing 15:00
Panel Discussion 15:30
Banquet Silver Ballroom 18:00

Friday, Dec 6

Session: Time Domain and 9:00
 Multi-messenger Astrophysics
Coffee Break and Poster Viewing 10:15
Session: AGN and Feedback 11:00
Lunch 12:30

Tuesday, December 3

Welcome 9:00

Amruta Jaodand and Dan Schwartz

Opening Remarks 9:05

Dr. Patrick Slane and Dr. Belinda Wilkes

Remarks 9:10

Dr. Daniel Evans, Director of Civil Space Policy
National Space Council, The White House

Galaxies, their ISM, and XRB Populations

Bret Lehmer 9:15

University of Arkansas

The Critical Role of Chandra Observations in Our Understanding Galaxy Evolution

Anna Wolter 9:45

INAF - OABrera

25 Years and Counting: Illuminating the Properties of
Ring Galaxies through X-ray and Multiwavelength Observations

Ioanna Psaradaki 10:00

Massachusetts Institute of Technology

Cosmic Dust Chemistry in the Diffuse ISM: Insights from
Chandra Observations and Laboratory Measurements

Rosanne Di Stefano 10:15

Center for Astrophysics | Harvard & Smithsonian

Chandra Discovers an Extragalactic Planet and a Range of Short-Lived Phenomena

Coffee Break and Poster Session 10:30

Silver Ballroom

AGN & Feedback — Galaxies, their ISM, and XRB Populations
Stars: Properties and Environments

Commander Eileen Collins, Mission Specialists Michel Tognini and Catherine Coleman, and
Pilot Jeffrey Ashby posing in front of Chandra in the Vertical Processing Facility

Scientists get a first look at Leon X-1,
the first source detected by Chandra



Stellar Properties and Environment

Katja Poppenhager

University of Arkansas

The physics of exoplanets and their host stars revealed by X-ray observations

11:00

Carey Lisse

INAF - OABrera

First Detection of a Resolved Astrosphere Around a Main Sequence G-Star by Chandra

11:30

Sean Gunderson

Massachusetts Institute of Technology

25 Years of Massive Stars with HETG

11:45

Konstantina Anastasopoulou

Center for Astrophysics | Harvard & Smithsonian

The EWOCs project: an X-ray view of young supermassive star clusters

12:00

Surangkana Rukdee

Max Planck Institute for Extraterrestrial Physics

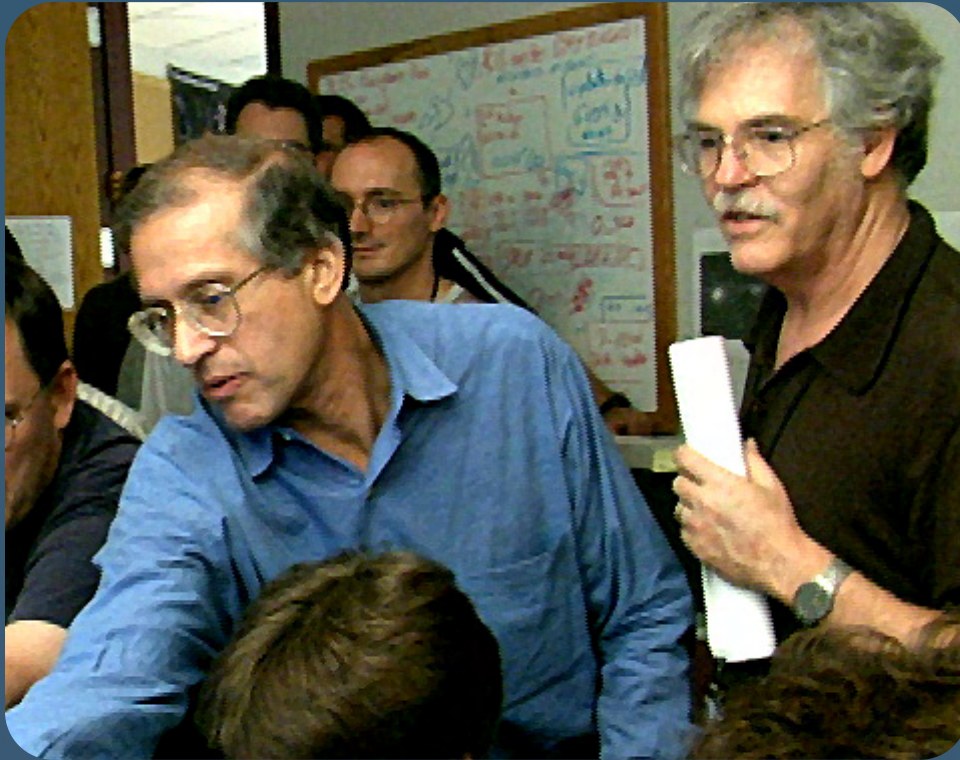
High Energy Diversity of Nearby Rocky Exoplanet Host Stars

12:15

Lunch Break

Silver Ballroom

12:30



Harvey Tananbaum and Martin Weisskopf as the first light image of Cas A appeared.

Chandra Retrospective

Chandra - The Early Years (1976–1999) 13:30

Harvey Tananbaum and Martin C. Weisskopf

Q&A Session 14:30

HRC Award Ceremony 14:45

Coffee Break and Poster Session 15:00
Silver Ballroom

AGN & Feedback — Galaxies, their ISM, and XRB Populations
Stars: Properties and Environments

Astronaut Session

The Launch of STS-93
and the Deployment of the
Chandra X-ray Observatory

Moderated by Patrick Slane

15:30

An Evening with the Astronauts will follow, with appetizers
and light refreshments in the Silver Ballroom



STS-93 mission astronauts pose with a small model of Chandra. From left, Collins, mission commander; Steven A. Hawley, mission specialist; Jeffrey S. Ashby, pilot; Michel Tognini and Catherine G. Coleman, both mission specialists.

Wednesday, December 3

Clusters and Cosmological Parameters

Michael McDonald Massachusetts Institute of Technology 10 Billion Years of Cluster Evolution with Chandra	9:00
Steve Allen Stanford University Galaxy Cluster Cosmology	9:15
Francesco Ubertosi University of Bologna The strong cool core cluster RBS 797: the Chandra window on extreme AGN feedback	9:30
Julia Sisk-Reynes Center for Astrophysics Harvard & Smithsonian Shedding light on the dark matter paradigm with Chandra	9:45
Michael Reefe Massachusetts Institute of Technology Mapping the Cooling Flow in the Phoenix Cluster with JWST and Chandra	10:00
Elena Bellomi Center for Astrophysics Harvard & Smithsonian Exploring Formation and Expansion of the Ancient Cold Front in Perseus Galaxy Cluster	10:15

Coffee Break and Poster Session

Silver Ballroom

10:30

Clusters and Cosmological Parameters — Retrospective
Solar System and Exoplanetary Systems — Stellar Remnants and Compact Objects
Time Domain and Multi-Messenger Astrophysics
Uniqueness of Sub-Arcsecond Resolution in X-ray Astronomy

Willard Simmons, Dan Shropshire, Leon McKendrick & Ken Gage
of Flight Ops Team in the Chandra Operations Control Center in 2001

Remarks

11:00

Dr. Ellen Stofan
Under Secretary for Science and Research
Smithsonian Institution

Solar System and Exoplanetary Systems

Lia Corrales

University of Michigan

From Cosmic Dust to Habitable Worlds: 25 years of insights from Chandra

11:10

Brad Wargelin

Center for Astrophysics | Harvard & Smithsonian

Stellar magnetic activity cycles in X-rays: Results from Chandra, XMM, and Swift

11:40

Scott Wolk

Center for Astrophysics | Harvard & Smithsonian

Detection of X-rays From Pluto by Chandra

11:55

Breanna Binder

California State Polytechnic University, Pomona

X-ray Emission of Nearby Low-Mass and Sun-Like Stars with Directly Imageable Habitable Zones

12:10

Konstantin Getman

The Pennsylvania State University

A Comparative Look at X-ray Flares from Pre-main Sequence Suns and the Contemporary Sun

12:25

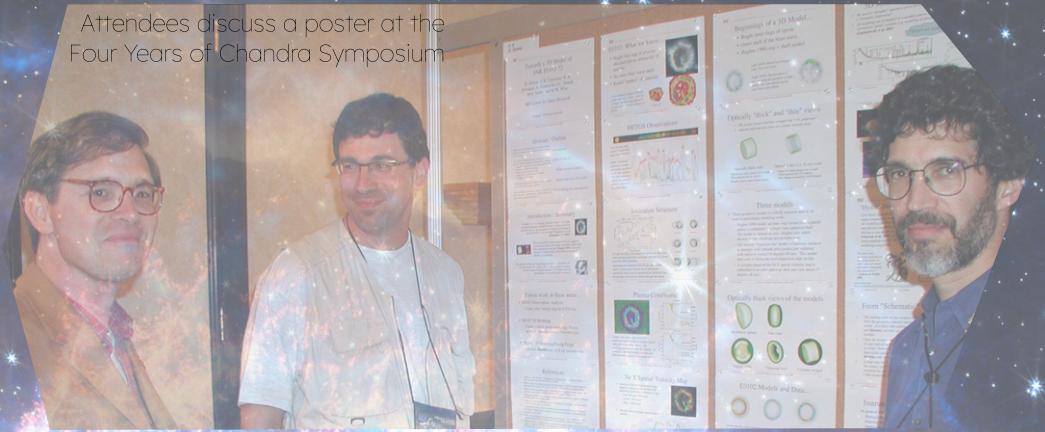
Lunch Break
Silver Ballroom

12:40



HRC Team inspecting the Flight Unit

Attendees discuss a poster at the Four Years of Chandra Symposium



Stellar Remnants and Compact Objects

Laura Lopez

The Ohio State University

Chandra's Detailed View of Supernova Remnants and the Hot Interstellar Medium

13:30

Oleg Kargaltsev

The George Washington University

Results from Deep CXO Imaging of a Number of Pulsar Wind Nebulae

14:00

Rodolfo Montez Jr.

Center for Astrophysics | Harvard & Smithsonian

X-rays from Planetary Nebulae: a Quarter Century of Shocking Chandra Discoveries

14:15

Vikram Dwarkadas

University of Chicago

Chandra's Exceptional Impact on Young Supernova Research

14:30

Sanskruti Sharma

The University of Texas at Arlington

3-D Mapping of X-ray Emitting Ejecta in Kepler's Supernova Remnant

14:45

Coffee Break and Poster Session

Silver Ballroom

15:00

Clusters and Cosmological Parameters — Retrospective
Solar System and Exoplanetary Systems — Stellar Remnants and Compact Objects
Time Domain and Multi-Messenger Astrophysics
Uniqueness of Sub-Arcsecond Resolution in X-ray Astronomy

Uniqueness of Sub-Arcsecond Resolution in X-ray Astronomy

David Pooley

Trinity University

Unique Discoveries Enabled by Chandra's Angular Resolution

15:30

Axel Donath

Center for Astrophysics | Harvard & Smithsonian

25 years in the life of SN 1987: revealing the highest resolution

X-ray structure with Chandra and Jolideco

16:00

Anna Barnacka

Center for Astrophysics | Harvard & Smithsonian

Boosting Chandra's Vision: Gravitational Lensing and the Quest for Binary AGNs

16:15

Martin Elvis

Center for Astrophysics | Harvard & Smithsonian

Using the Ultimate Resolution of Chandra to Image AGN Feedback

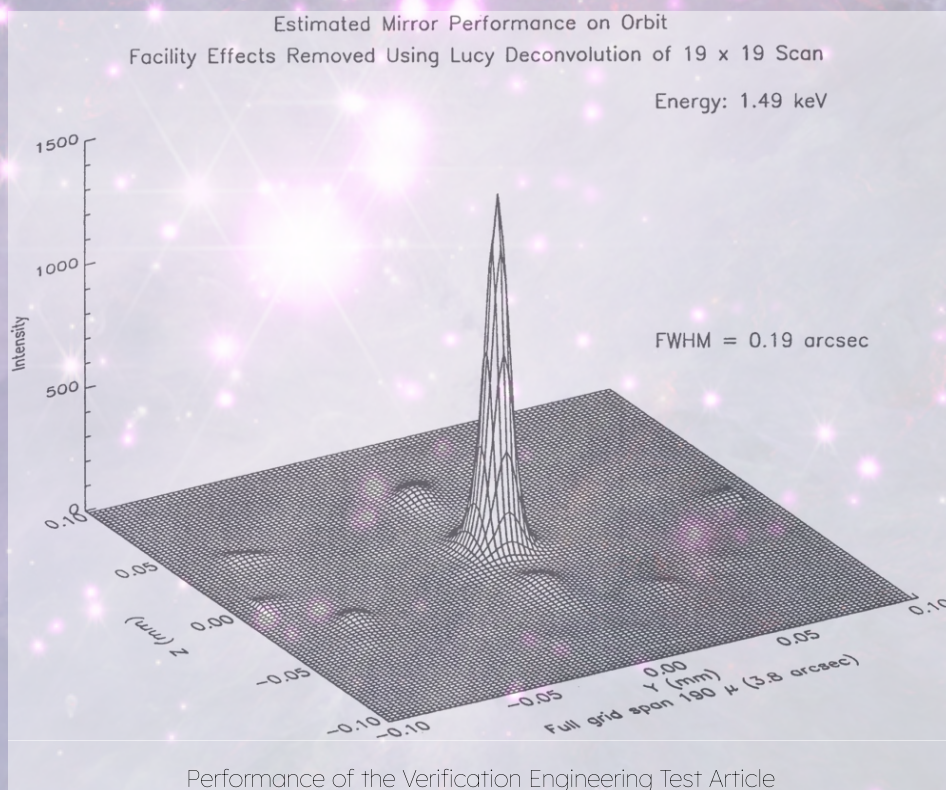
16:30

Aneta Siemiginowska

Center for Astrophysics | Harvard & Smithsonian

Chandra Insights into the Impact of Evolving Radio Jets on the Interstellar Medium from Parsecs to Kiloparsecs

16:45



Thursday, December 5

Chandra Synergies with Multi-wavelength Facilities

Tom Maccarone

Texas Tech University

Current and Future possibilities – unique synergy with high resolution new and upcoming large multi-wavelength facilities

9:00

Akos Bogdan

Center for Astrophysics | Harvard & Smithsonian

A Chandra-JWST Synergy: Detecting the First Supermassive Black Holes

9:30

Fabio Pacucci

Center for Astrophysics | Harvard & Smithsonian

Widespread Super-Eddington Accretion in JWST's Little Red Dots Explains the X-ray Weakness Problem

9:45

Johannes Buchner

Max Planck Institute for extraterrestrial Physics

Compton-thick AGN: The hidden population at cosmic noon revealed by Chandra

10:00

Michael Calzadilla

Center for Astrophysics | Harvard & Smithsonian

Revealing the Evolution of AGN Feedback in Galaxy Clusters Over the Last 10 Gyr

10:15

Coffee Break and Poster Session

Silver Ballroom

Galaxies, their ISM, and X-ray Binary Populations

Sky Surveys and the Chandra Source Catalog

X-ray Binaries — Chandra Synergies with Multi-wavelength Facilities

10:30



Members of the Chandra and XMM-Newton teams pose together at the X-ray 2019 conference in Bologna, Italy



Attendees at the April 2001 CIAO Workshop

X-ray Binaries

Joey Neilsen

Villanova University

The Ins and Outs of X-ray Binaries with Chandra

11:00

Herman Marshall

MIT Kavli Institute

25 Years of Chandra Observations of SS 433

11:30

Shifra Mandel

Columbia University

A Comprehensive Study of the Galactic Center X-ray Source Populations

11:45

Daniele Rogantini

University of Chicago

The interplay between jet and wind in the X-ray binary GX 13+1

12:00

Marina Orio

University of Wisconsin, Madison

A legacy of Chandra: the intricate spectra of novae in outburst and supersoft X-ray sources

12:15

Lunch Break

Silver Ballroom

12:30

Sky Surveys and the Chandra Source Catalog

Rafael Martínez-Galarza

Center for Astrophysics | Harvard & Smithsonian

The Chandra Source Catalog: A Legacy Product for Machine Learning
Discovery in High Energy Astrophysics

13:30

Nico Cappelluti

University of Miami

Unveiling the population of X-ray sources among high-z Chandra Sources: the CXB fully resolved

14:00

Jeremy Hare

NASA Goddard Space Flight Center

Classification of Serendipitous Chandra Source Catalog Sources Using a
Multiwavelength Machine Learning Approach

14:15

Ian N. Evans

Center for Astrophysics | Harvard & Smithsonian

The Chandra Source Catalog

14:30

Guido Risaliti

University of Florence

Quasars as high-redshift standard candles

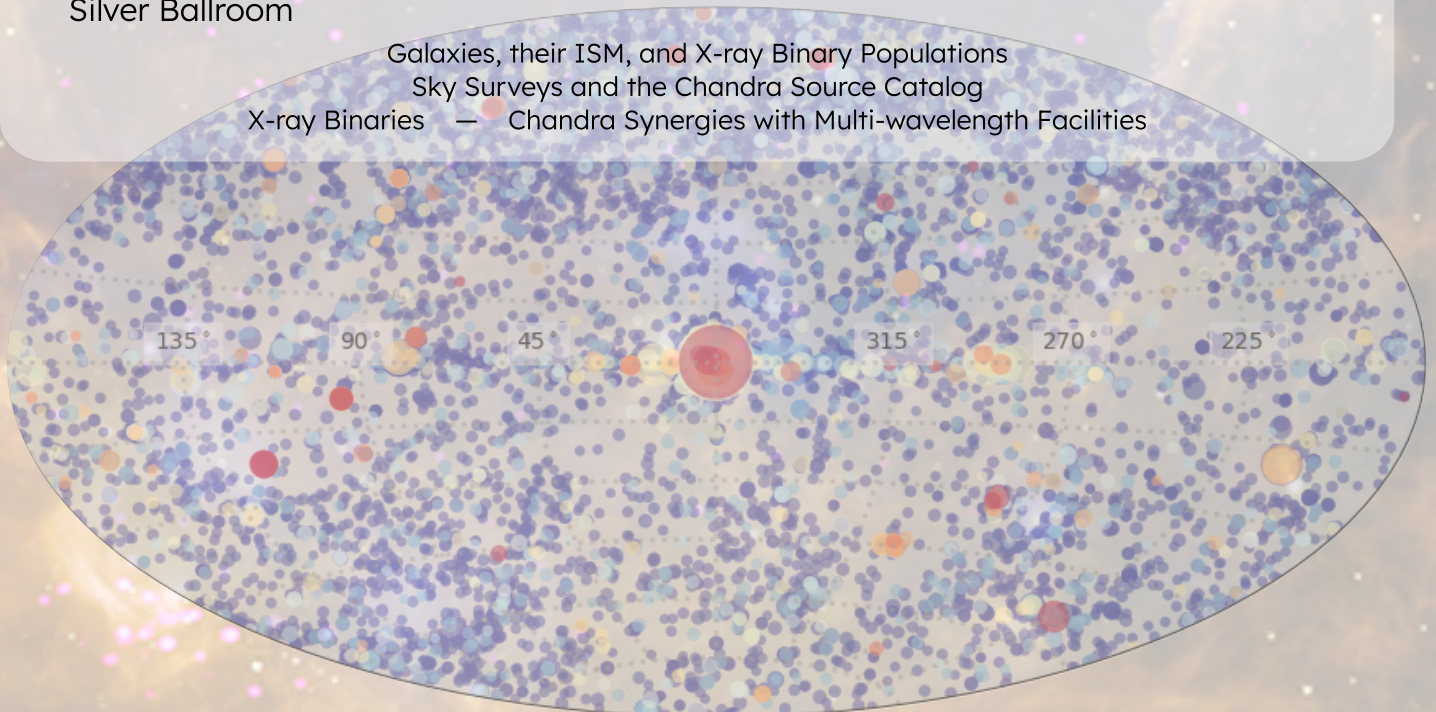
14:45

Coffee Break and Poster Session

Silver Ballroom

15:00

Galaxies, their ISM, and X-ray Binary Populations
Sky Surveys and the Chandra Source Catalog
X-ray Binaries — Chandra Synergies with Multi-wavelength Facilities





Members of the Chandra Director's Office wait to respond to questions from proposers as the Cycle 17 Call for Proposals deadline nears

Panel Discussion

15:30

Chandra's Unique Capabilities: What Can and Should Chandra Do in the Next 5 Years?

Andrew Fabian
Raffaella Margutti

Erin Kara
Norbert Schartel

Moderated by Grant Tremblay

Symposium Banquet

Silver Ballroom

18:00

Friday, December 6

Time Domain and Multi-Messenger Astrophysics

Daryl Haggard

McGill University

Things that go bump in the night :

Chandra's Take on Neutron Star Mergers, Supernovae and More

9:00

Dheeraj Pasham

Massachusetts Institute of Technology

Quasi-periodic X-ray eruptions years after a nearby tidal disruption event

9:30

Jordy Davelaar

Princeton University

Tell-tale electromagnetic signatures of massive black hole binaries

9:45

Lea Marcotulli

Yale University

A variable monster at the Epoch of Reionization

10:00



Attendees of the Chandra's First Decade Symposium in 2009

Coffee Break

Silver Ballroom

There are no posters on Friday

10:15



The Chandra Operations Control Center in Burlington, MA in 2019 (left) and in Cambridge, MA in 2001 (below)



AGN and Feedback

Eileen Meyer

University of Maryland, Baltimore County

Relativistic Jets at kpc scales: unintended discoveries & enduring mysteries from the first 25 years of Chandra

11:00

Liyi Gu

SRON Netherlands Institute for Space Research

From Chandra to XRISM: Evolving Winds from NGC 3783

11:30

Qian Yang

Center for Astrophysics | Harvard & Smithsonian

Understanding Changing-look Quasar Transitions using Chandra and SDSS-V

11:45

Luca Ighina

Center for Astrophysics | Harvard & Smithsonian and INAF-Brera

The most distant relativistic jet resolved by Chandra

12:00

Marine Prunier

UdeM - MPIA

X-ray cavities from AGN feedback: a comparative analysis between Chandra observations and the TNG-Cluster simulation

12:15

Lunch and End of Symposium

Silver Ballroom — Lunch will be prepared for takeaway

12:30

Tuesday Posters

- 1 Peter Boorman
- 2 Marko Micic
- 3 Nathan Cristello
- 4 Riccardo Middei
- 5 Onic I. Shuvo
- 6 Dominika Król
- 7 Kendrah D. Murphy
- 8 Ewan O'Sullivan
- 9 Anna Trindade Falcão
- 10 Pepi Fabbiano
- 11 Anna Juranova
- 12 Zhibo Yu
- 13 Jaya Maithil
- 14 Thomas Connor
- 15 Erik B. Monson
- 16 Joshua Kingsbury
- 17 Luan Luan
- 18 Mihoko Yukita
- 19 Margaritis Chatzis
- 20 Antara Basu-Zych
- 21 Jimmy Irwin
- 22 Lauranne Lanz
- 23 Thomas Ayres
- 24 Jeremy J. Drake
- 25 David Principe
- 26 Konstantina Anastasopoulou
- 27 Nancy Remage Evans
- 28 Robert Zimmerman
- 29 Andrey Tavleev
- 30 Vinay Kashyap

An intermediate mass black hole growing within a dense circum-nuclear environment
Low-mass galaxy interactions trigger black hole accretion

An Eddington-Limited Active Galactic Nucleus Hidden in a Dust-Obscured Galaxy at $z \sim 0.8$
Unveiling the complex environment of the nearby obscured AGN NGC 1386

Probing the High-Energy Mysteries of Bipolar Jets in Active Galaxies with CHANDRA
The Origin of the X-Ray Emission in Heavily Obscured Compact Radio Sources

The narrow line structure in the Chandra-HETG spectra of NGC 3227

Examining the extremes of cooling and feedback: The cluster-central type-II QSO in IRAS 09104+4109
Discovery of kpc-scale semi-relativistic Fe KA emission in NGC 5728

Three types of AGN feedback seen by Chandra

A new look at AGN outflows: Constraints from spectral-timing analysis

The Remarkable X-ray Spectra and Variability of the Ultraluminous Weak-Line Quasar SDSS J1521+5202

Unveiling X-ray jet emission in high-redshift radio-loud quasars with no continuous radio jet
SQuEoRRLs: Chandra's view of radio-loud AGN in the Epoch of Reionization

Subgalactic Hot Gas Scaling Relationships in NGC 4254
Based on Star Formation History Maps

Constraining the Nature of the Super-Virial Temperature Component of the Milky-Way CGM

Diffuse X-ray emission in M51: a hierarchical Bayesian spatially-resolved spectral analysis
A Search for Hard X-ray Nebulae in Star-forming Galaxies with Chandra

Shining X-ray light on the low-metallicity starburst ESO 338-4

Young and Excited: Investigation of the energetic processes from stellar populations and X-ray binaries

Luminous Hypersoft X-ray Sources in Nearby Galaxies

Constraining AGN Properties in Recently Quenched Galaxies with Low-Count Chandra Observations

Cycles and the Seven Dwarfs

Balancing the Flare Energy Budget in M-type Dwarfs

Searching for Coronae at the Earliest Stage of Young Stellar Evolution

EWOCS: The X-ray properties of the largest Galactic group of Wolf-Rayet stars in the young and supermassive star cluster Westerlund 1.

Identifying Low-mass Companions of Intermediate-mass Stars: X-rays in Cepheids

Separating States in High-Energy Astronomical Sources Using Hidden Markov Models

Soft X-ray emission from the classical nova AT 2018bej

Persistence of Quiescence on active dMe star EV Lac

Wednesday Posters

- 1 Anthony Flores
- 2 Haley R. Stueber
- 3 Courtney Watson
- 4 Edmund M. Douglass
- 5 Elizabeth Blanton
- 6 Laurel White
- 7 Chaymae Karam
- 8 Saloni Bhatiani
- 9 Scott Randall
- 10 Norbert Schartel
- 11 Carey M. Lisse
- 12 Scott Wolk
- 13 Xi Long
- 14 Paul Plucinsky
- 15 Kisetsu Tsuge
- 16 Hidetoshi Sano
- 17 Tea Temim
- 18 Daniel Castro
- 19 Jessye Gassel
- 20 Mayura Balakrishnan
- 21 Connor McClellan
- 22 Valery Suleimanov
- 23 Frits Paerels
- 24 Seth Gagnon
- 25 Vladimir Karas
- 26 Silas Laycock
- 27 Malgosia Sobolewska
- 28 Vikram Dwarkadas
- 29 Melania Nynka

Spatially-resolved X-ray Measurements of the Highest Redshift
Dynamically Relaxed Cool Core Galaxy Cluster

New Observations of High Redshift Relaxed
Cool Core Cluster SPT-CL J2215-3537

Analyzing Sloshing Dynamics and AGN Feedback in Abell 2029

Gas Sloshing Spirals and Cool Core Disruption in Galaxy Clusters

Chandra Observations of a High-Redshift ($z=1.8$) Cluster
Candidate from the COBRA survey
CEREAL: A Chandra Legacy Sample

Implications of $f(Q)$ Gravity on Cosmological Parameters

Constraining the planet-mass population in distant
galaxies using Quasar microlensing

Intercluster Filaments, Cluster Outskirts, and the Interface
Between Galaxy Clusters and the Cosmic Web
XMM-Newton: Scientific Strategy

Chandra Observations of Comets

X-rays in the Prime of Life

Chandra Large Project Observation of N132D:
Expansion of the Forward Shock

Chandra Legacy Observation of the LMC SNR N132D:
Spatial Distribution of the Intermediate Mass Elements and Fe
Shock heated Clouds in the LMC SNR N132D Revealed by ALMA ACA

Chandra and ALMA studies of Supernova Remnants

Understanding Supernova Remnants through X-ray and Infrared Synergy

The Expansion and Width of the Synchrotron Filaments
Associated with the Forward Shocks of SNRs

Continued Monitoring with Chandra of
Tycho's Supernova Remnant for Over 20 Years
The First X-ray Map of Sgr A East

Time-Dependent Numerical Simulations of Super-Eddington
Winds During Neutron Star Photospheric Radius Expansion Bursts

Model atmospheres as a tool for
high resolution soft X-ray spectra interpretation

Photospheric Spectroscopy of Neutron Stars in Supernova Remnants

Systematic census of X-ray properties of PWNe
observed by Chandra X-ray Observatory.

Polarimetric features from spots orbiting near a black hole - II.

How massive can a stellar black hole be? Chandra's
multi-observatory time-domain study of the IC 10 X-1 binary system.

Stars disrupted by potential centuries old tidal disruption events

Understanding the X-Ray Emission From Stripped
Envelope Supernovae Interacting with a Dense Circumstellar Medium

Chandra and NuSTAR observations of the Orion Nebula Cluster flares

Thursday Posters

- 1 Junfeng Wang
- 2 Bret Lehmer
- 3 Madison Norwood
- 4 Ryder Smith
- 5 Steven Chen
- 6 Victor Samuel Perez Diaz
- 7 Ryan Hickox
- 8 Stephanie LaMassa
- 9 Amruta Jaodand
- 10 Wasundara Athukoralalage
- 11 Emerson Gehr
- 12 Zachary Wilson
- 13 Michael McCollough
- 14 Josephine Wong
- 15 Jiachang Zhang
- 16 Kewal Anand
- 17 Justina Yang
- 18 Payaswini Saikia
- 19 Eric M Schlegel

Sub-kiloparsec scaling relations between hot gas, dense gas and star formation rate in nearby star-forming galaxies

The Critical Role of Chandra Observations in Our Understanding Galaxy Evolution

X-ray Spectral Modeling of Luminous Infrared Galaxies: Understanding Hot Gas and X-ray Binary Populations in the Most Active Local Starbursts
Properties of the X-ray Emitting Interstellar Medium in M83

Exploring the X-ray Source Population in Globular Clusters with a Machine Learning Approach
Exploring astronomical catalog crossmatching with machine learning

STACKFAST - A Flexible Online Chandra Stacking Tool

Third Catalog Release of Stripe 82X: Black Hole Masses and New Spectroscopic Redshifts
Searching for pulsars in the Chandra Source Catalog

SMC X-1 in Excursion: Exploring a Changing Accretion Disk

Quantifying the Impact of Stochastic Scatter of X-ray Binary Populations on the Spectra of Galaxies
Using X-ray Colors to Quantify Spectral Diversity of X-ray Binary Populations

Chandra Observations of Cygnus X-3 Over the Last 25 Years

Phase-Resolved Spectral Analysis of Cygnus X-3 during Quiescent State with Chandra
A Chandra search for periodic X-ray sources in the bulge of M31

Understanding the origin of QPOs and constraining neutron star parameters from the QPO triplets observed in 4U 1728-34
Emulating the Effects of Pile-Up on X-ray Spectra

Witnessing the onset of a black hole outburst with Chandra

SpectralFitting.jl and High-Resolution X-ray Spectra



Members of the Chandra team pose at the HEAD Meeting in April 2023





LOC Members walk through the Revere in June 2024

Evan Tingle prepares a shipment for the 25 Years of Science with Chandra Symposium



Science Organizing Committee

Amruta Jaodand (Co-Chair)

Dan Schwartz (Co-Chair)

Mojegan Azadi — McKinley Brumback

Jeremy Drake — Hannah Penn Earnshaw

Steven Ehlert — Pepi Fabbiano

Victoria Grinberg — Julie Hlavacek-Larrondo

Elisabeta Lusso — Herman Marshall

Priya Natarajan — Michela Negro

Jack Steiner — Tea Temim

Catherine Cranmer prepares badges for the 25 Years of Science with Chandra Symposium



Local Organizing Committee

Amruta Jaodand (Co-Chair)

Thomas Connor (Co-Chair)

Jason Conry

Katie Cranmer

Antonella Fruscione

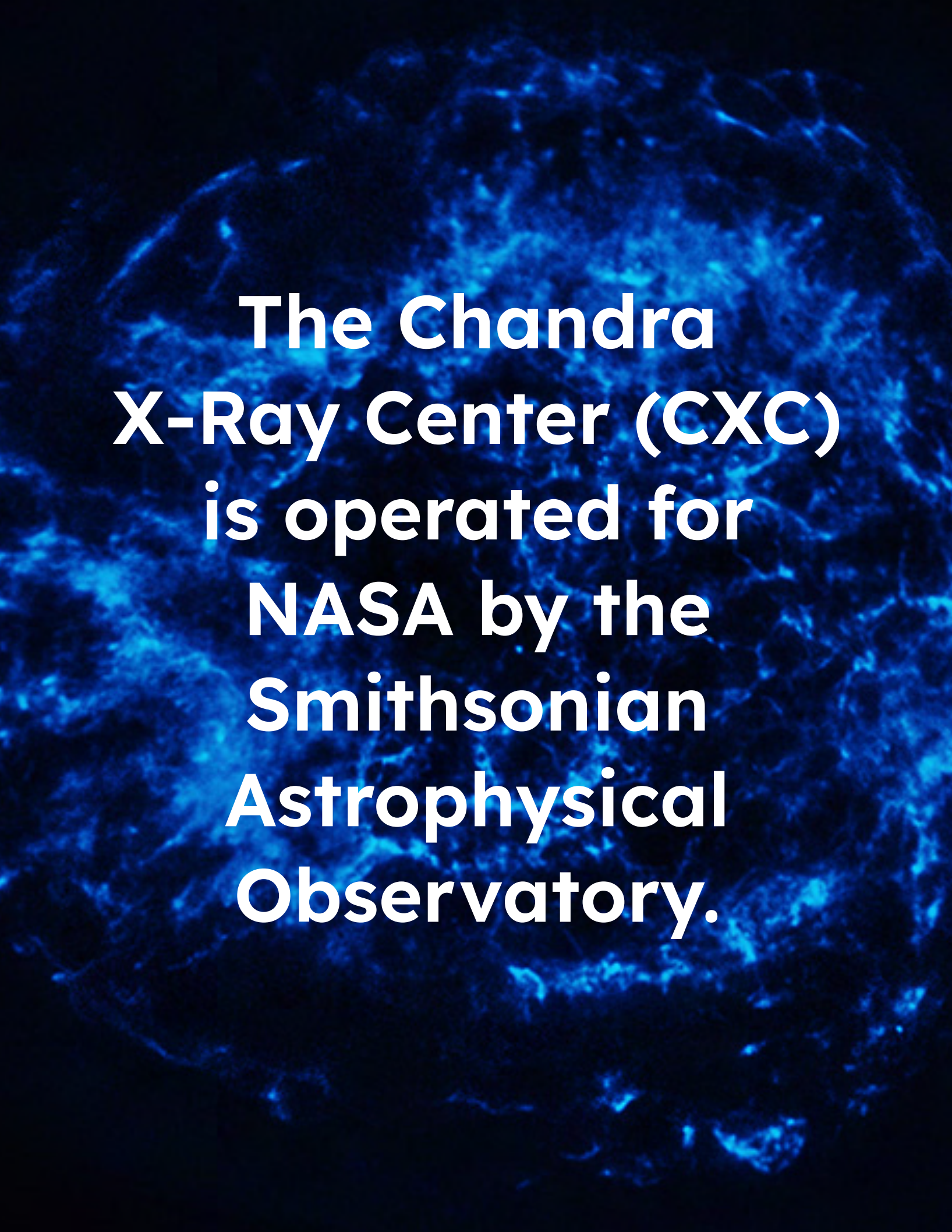
Tara Gokas

Rodolfo Montez

Padmanabhan Ramadurai

Aldo Solares

Evan Tingle



**The Chandra
X-Ray Center (CXC)
is operated for
NASA by the
Smithsonian
Astrophysical
Observatory.**