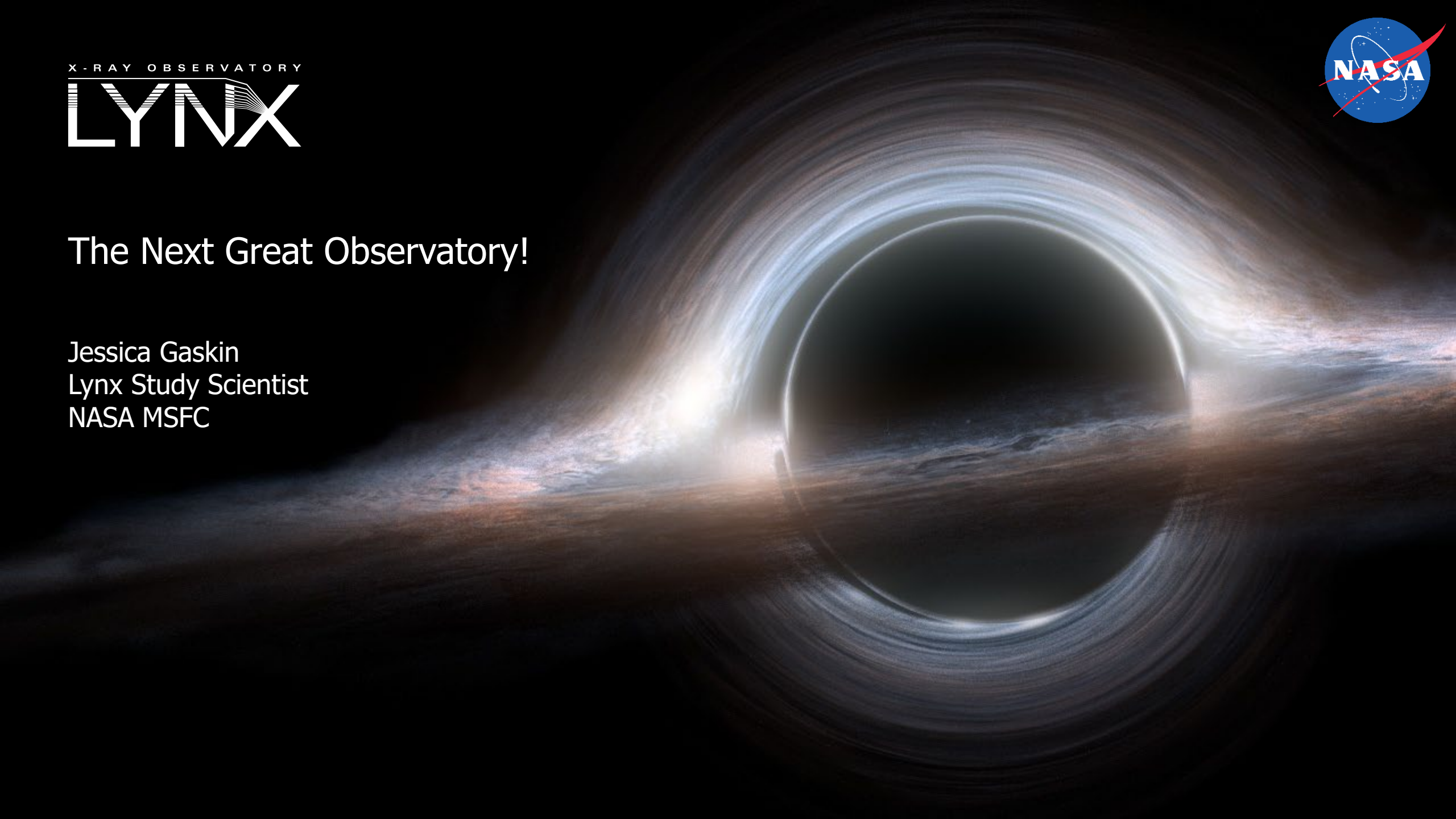




The Next Great Observatory!

Jessica Gaskin
Lynx Study Scientist
NASA MSFC



CHANDRA X-RAY OBSERVATORY



Chandra detects and images X-ray sources that are billions of light years away.

This focusing power is equivalent to the ability to read a newspaper at a distance of half a mile!



Milky Way Central Region



Jupiter



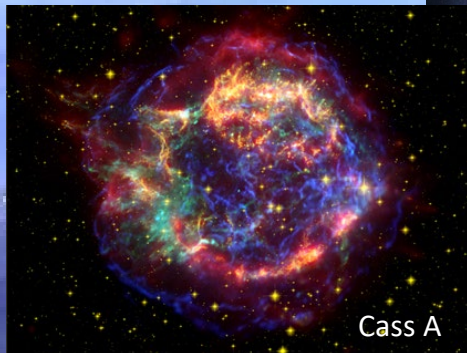
NGC 4258 (M106)



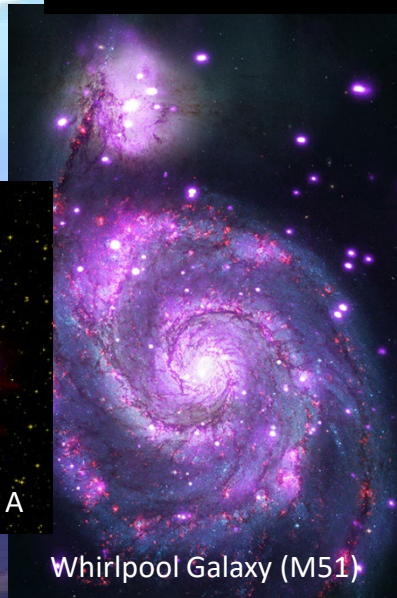
NGC 6357



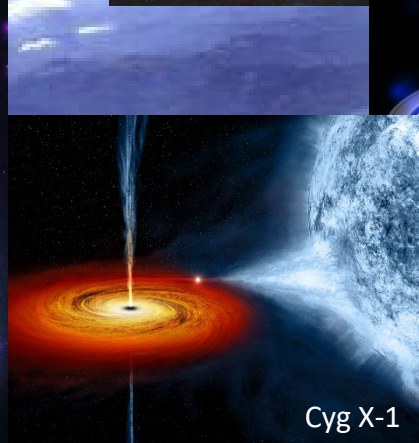
Crab Nebula



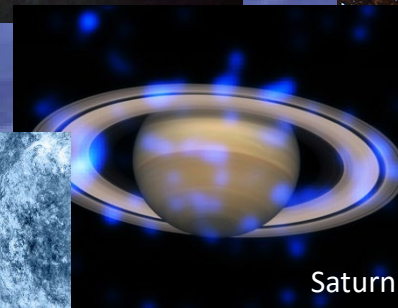
Cass A



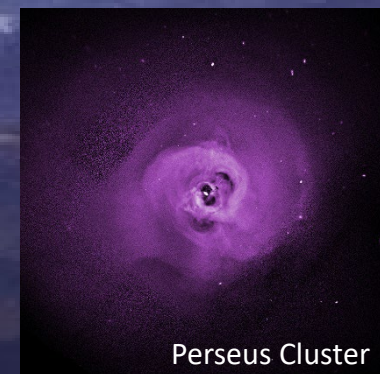
Whirlpool Galaxy (M51)



Cyg X-1



Saturn

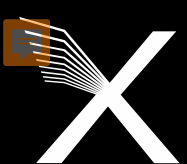


Perseus Cluster

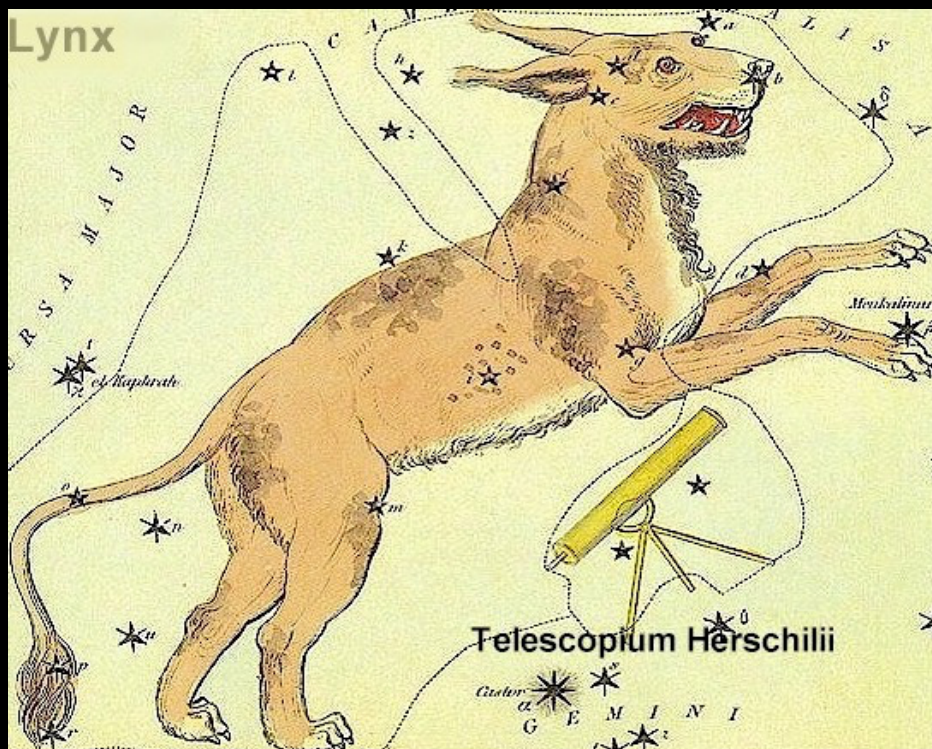


L
Y
N
X



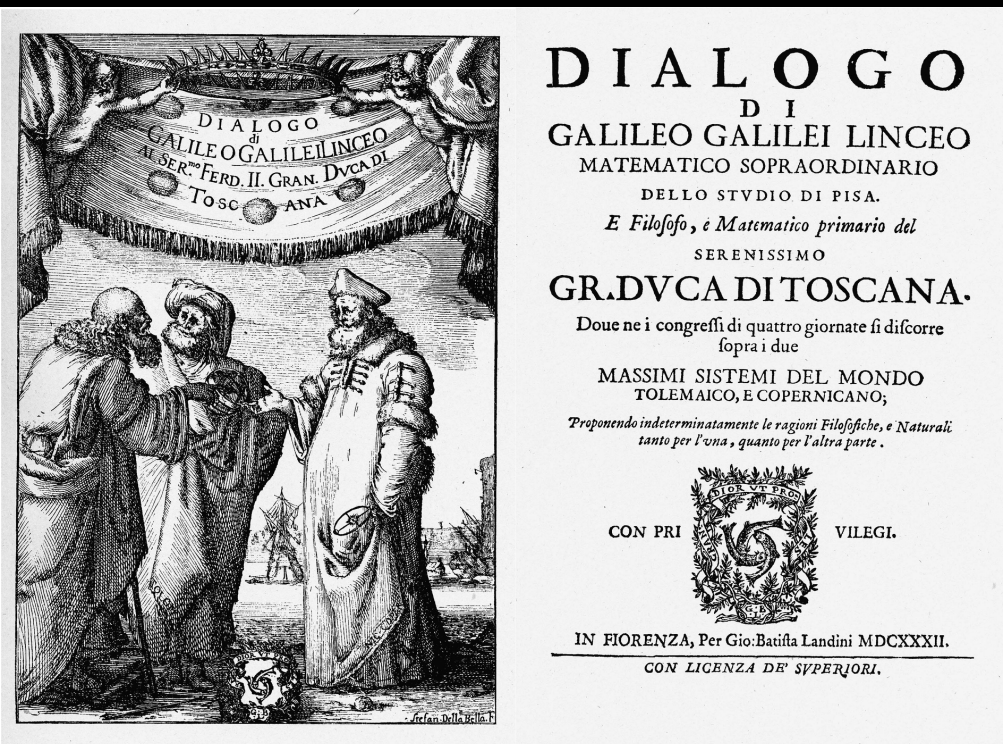


LYNX: THE NEXT GREAT OBSERVATORY



A symbol of great insight with
the ability to see through
rocks and trees to reveal the
true nature of thing.

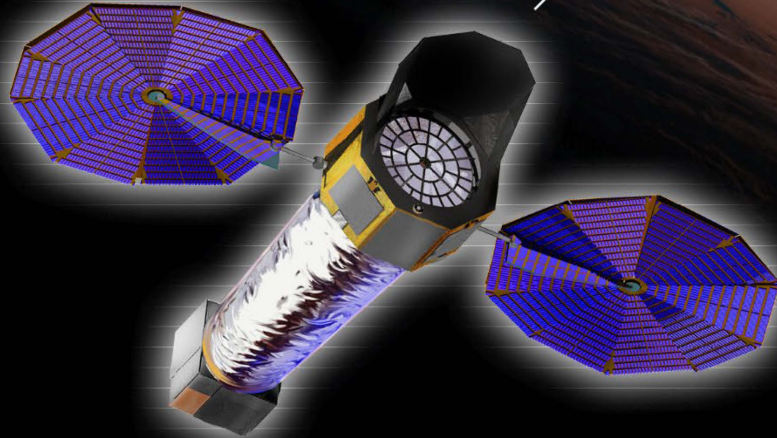
Academy of the 'Lynx-Eyed'
Perform incisive and penetrating
investigations of the natural world.



A NEW GREAT OBSERVATORY

X-RAY MIRROR ASSEMBLY

0.5" Point-Spread Function,
stable over a 20 arcminute FoV



HIGH DEFINITION X-RAY IMAGER

Designed for exquisite imaging and wide surveys, the HDXI is an active pixel array covering a 20' x 20' field of view with subarcsecond imaging.

LYNX X-RAY MICROCALORIMETER

Spatially resolved 3 eV spectroscopy across a 5'x5' field of view, sampled with 1" pixels. Two subarrays optimized for finer imaging and higher spectral resolution.

X-RAY GRATINGS SPECTROMETER

Spectral resolving power of $R > 5000$ with $\sim 4000 \text{ cm}^2$ of effective area across the critical X-ray emission and absorption lines of C, O, Mg, Ne, and Fe-L.

HIGH DEFINITION X-RAY IMAGER

LYNX X-RAY MICROCALORIMETER

X-RAY GRATINGS SPECTROMETER

EINSTEIN

CHANDRA

Lynx



Chandra



“Other” X-ray Telescopes

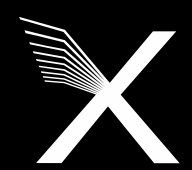


Created by David J. Marmor, MFA and Michael F. Marmor, MD © 2010 Archives of Ophthalmology

50x higher throughput while maintaining *Chandra's* angular resolution.

Like going from your 8" backyard telescope to a 10-m Keck.

What takes Chandra 8 weeks, Lynx can do in ~1 day for deep surveys.



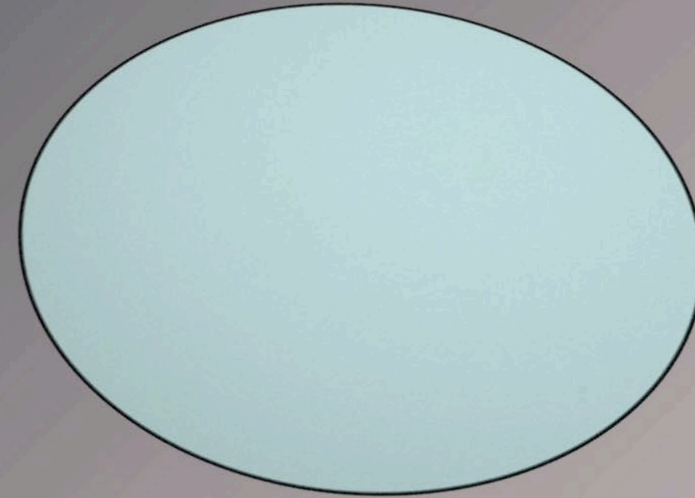
LYNX X-RAY OBSERVATORY



Lynx has a 3m diameter with a 10m focal length.



JWST Primary Mirror: 6.5 m



Lynx Mirror: 25 m
(effective diameter)



THE SCIENCE

Lynx is designed to pursue three science pillars.

There are ample resources for many other programs, including those unexpected today.

It will be a discovery platform for all.

WWW.HIDDENCOSMOS.ORG



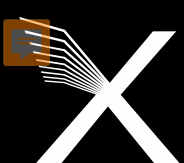
DAWN OF BLACK HOLES



DRIVERS OF
GALAXY EVOLUTION



THE ENERGETIC SIDE OF
STELLAR EVOLUTION



BLACK HOLE DAWN

Simulated Deep Fields
Illustris-TNG

New Record Breaking Quasars

J1342+0928; $z=7.54$; 800 million Msun!

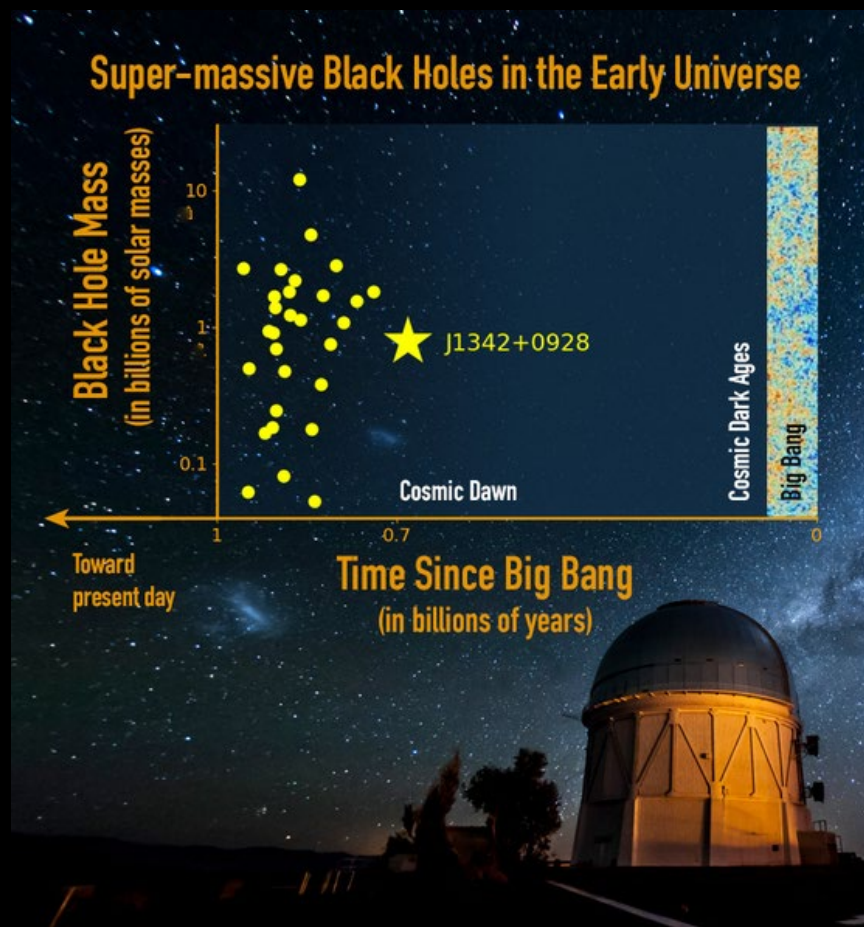


Image credit: Jinyi Tang/UA, Reinald Hahn/Fermilab;
M. Newhouse/NOAO/AURA/NSF

Stellar Mass

Intermediate
Mass

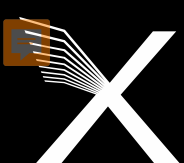
Massive

Supermassive

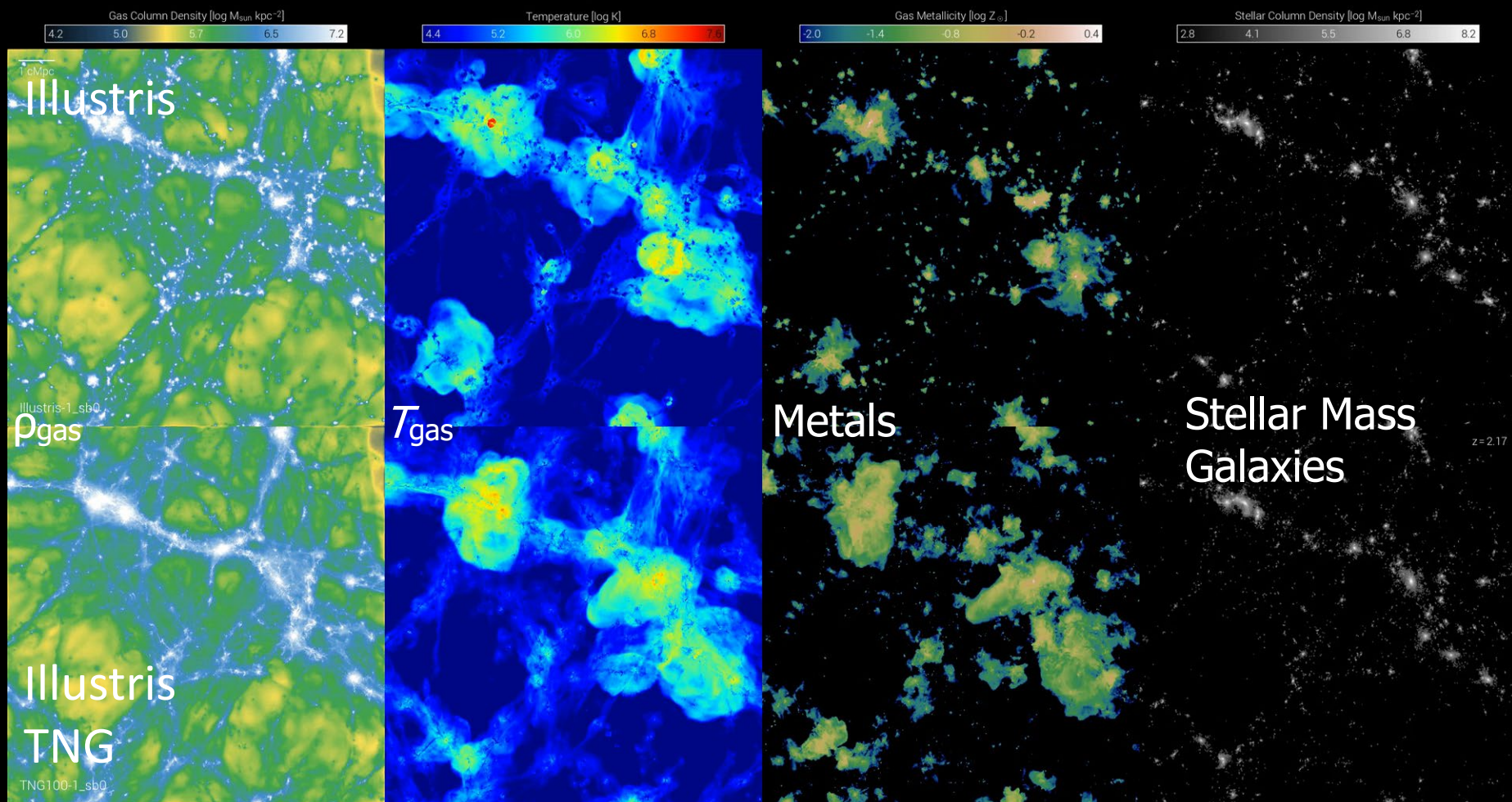
JWST

Lynx

ATHENA



ENGINES OF CHANGE





THE DISTANT LIGHT OF
INFANT SUNS

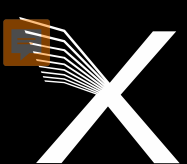
WORLDS BEYOND OUR OWN

THE MILKY WAY

THE SUN

CHANDRA HORIZON
FOR YOUNG STAR
CLUSTERS

X HORIZON

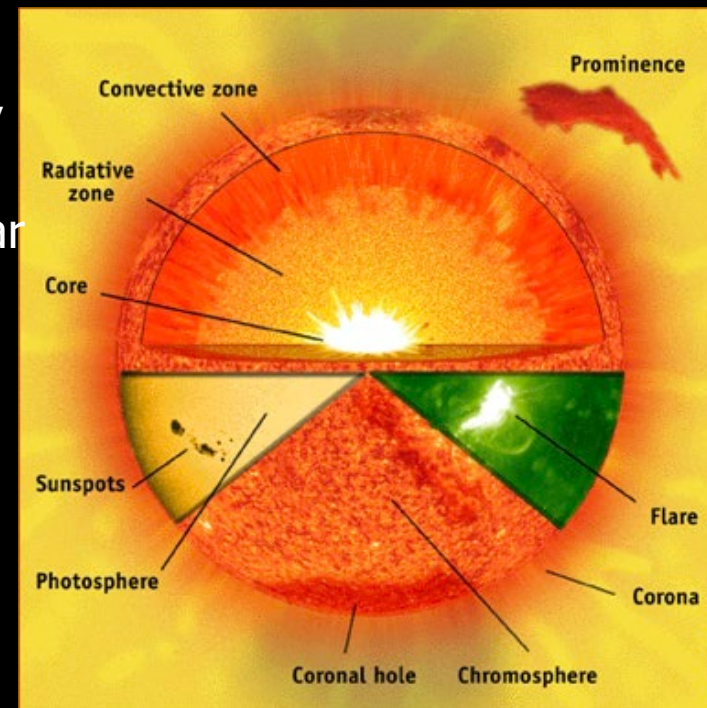
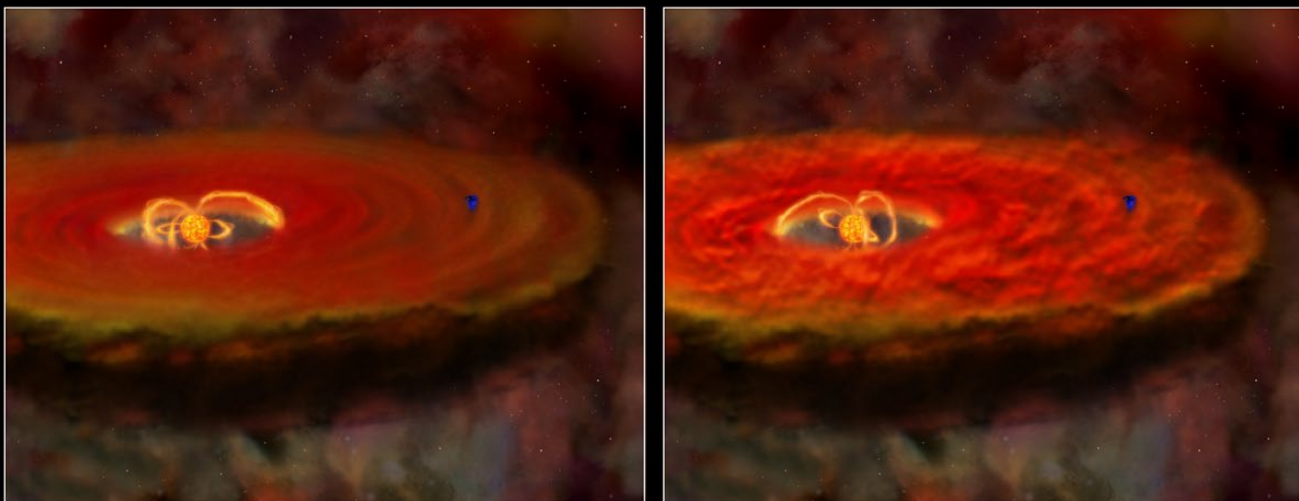


HIDDEN LIGHT OF SUNS

Where do planets form? Where do they migrate?

- X-ray spectra of young stars show more than accretion plus magnetic activity
- X-rays implicated in rapid heating of protoplanetary disks
- After stars lose their disks X-ray surveys are the only way to find young stellar objects

How do the characteristics of flares change with time and what impact does this have on exoplanet conditions?



The star's magnetic field creates an ecosystem which helps to set the environment that planets (and life) experience (Lingam & Loeb 2018) Stellar magnetospheres influence the inner edge of the traditional habitable zone (Garaffo et al. 2016, 2017).

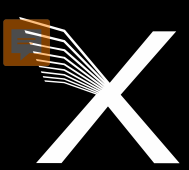
- Systematic change of T_{max} , E_{flare} , $L_{\text{x,max}}$ on flares of stars with varying mass, age, magnetic configuration as input to evolution of planetary irradiation
- Influence of energetic particles inferred from line profiles

Credit: R. Osten

ASTROPHYSICS

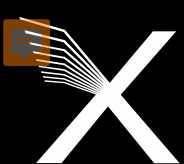
Decadal Survey Missions



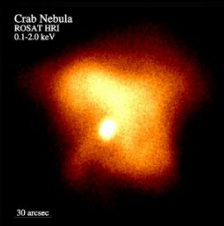


“Light, Light, The visible
reminder of invisible
light” – T.S. Eliot





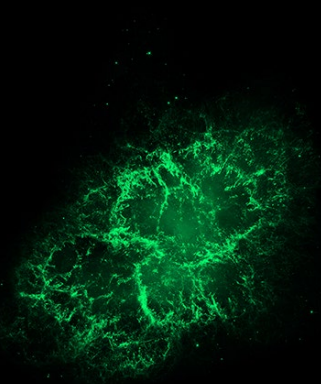
THE CRAB NEBULA



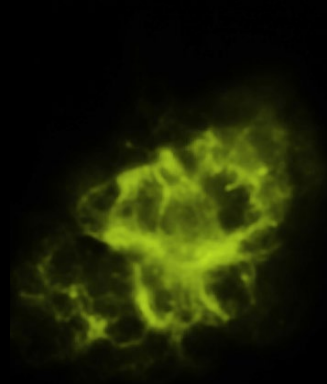
ROSAT
(X-ray)
Resolution: 5 arcsec



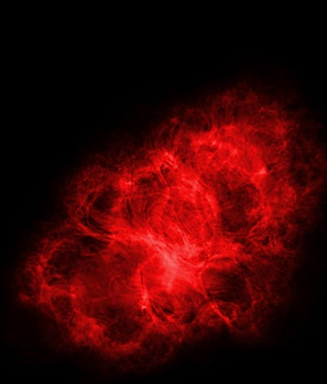
Chandra
(X-ray)
Resolution: 0.5 arcsec



Hubble
(visible)
Resolution: 0.05 arcsec



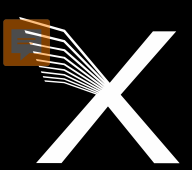
Spitzer
(IR)



VLA
(radio)



XMM-OM
(UV)



FINAL THOUGHT & COMPELLING LYNX QUESTION

Are Cats Spies Sent by Aliens? A Deep Examination of One of the Internet's Best Conspiracy Theories

If you hold a cat's ears back and describe what you see, it is a perfect match to the classic "grey alien," with its almond-shaped eyes, small mouth, and small nose.

Obviously true. See below.

LEFT TO RIGHT, IMAGES VIA [FLICKR](#) AND [WIKIMEDIA COMMONS](#)



THANK YOU!

<https://www.wastro.msfc.nasa.gov/lynx/>

<https://www.lynxobservatory.com>

<https://chandra.harvard.edu/>