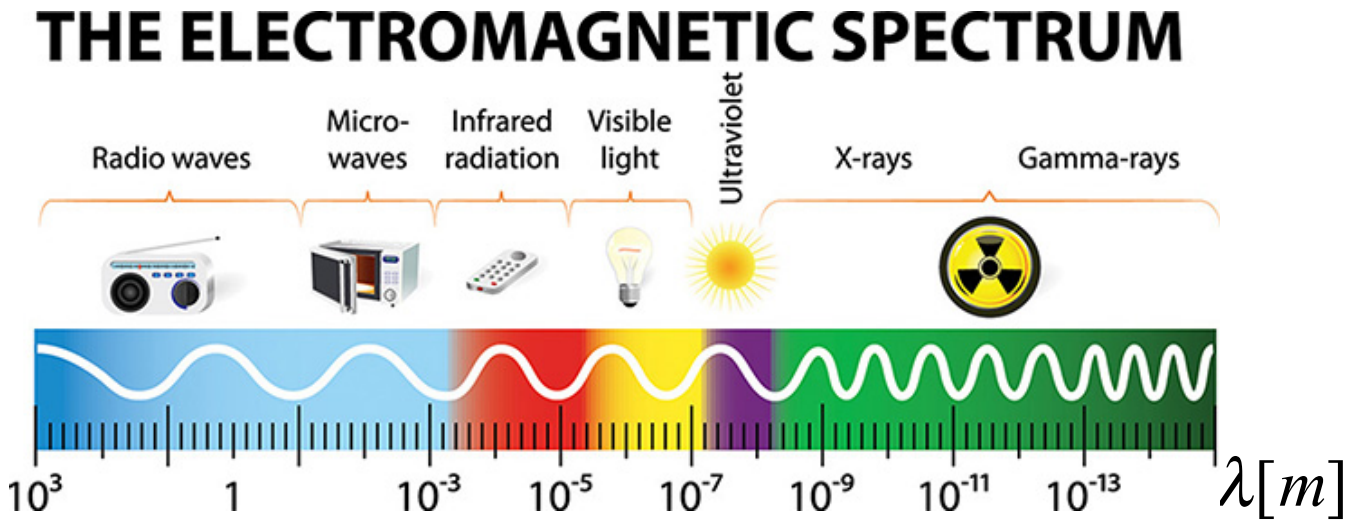
# Activities of the Gamma-SIG

Henric Krawczynski & John Tomsick on behalf of the Gamma-SIG

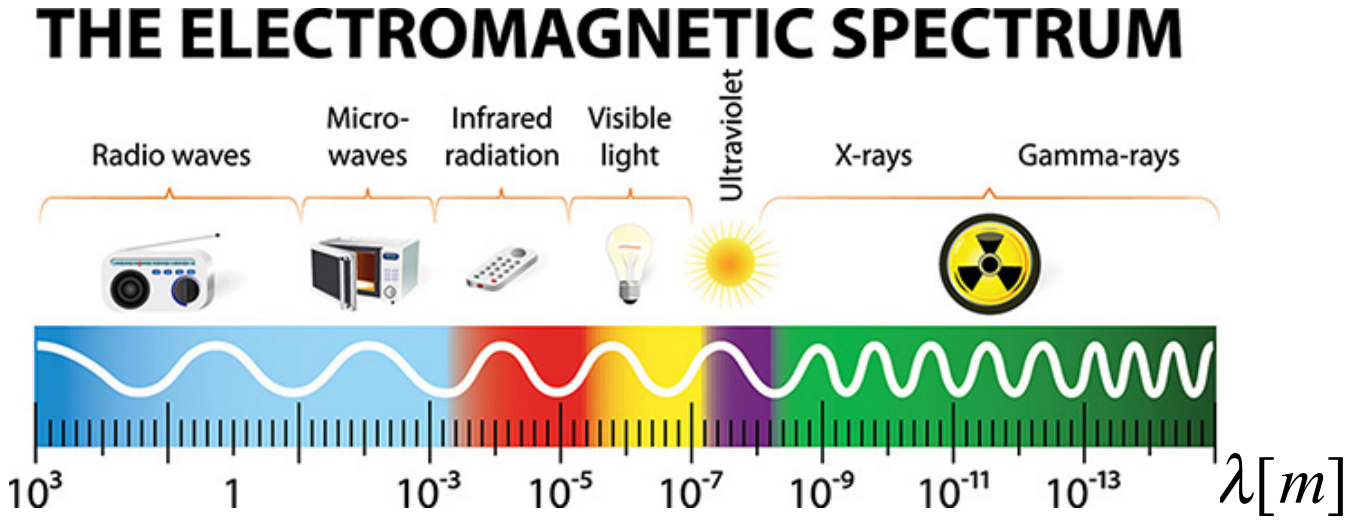
1/30/2017

Plan of Talk:

- 2010-2020: Golden Decade of Gamma-Ray Astronomy.
- Future Directions:
  - Possible Hard X-ray and Gamma-Ray Probes.
- Upcoming activities of the Gamma-SIG.




X-ray SIG Gamma SIG

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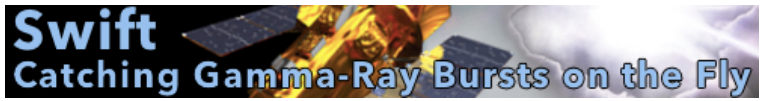



(2004)


(2008)

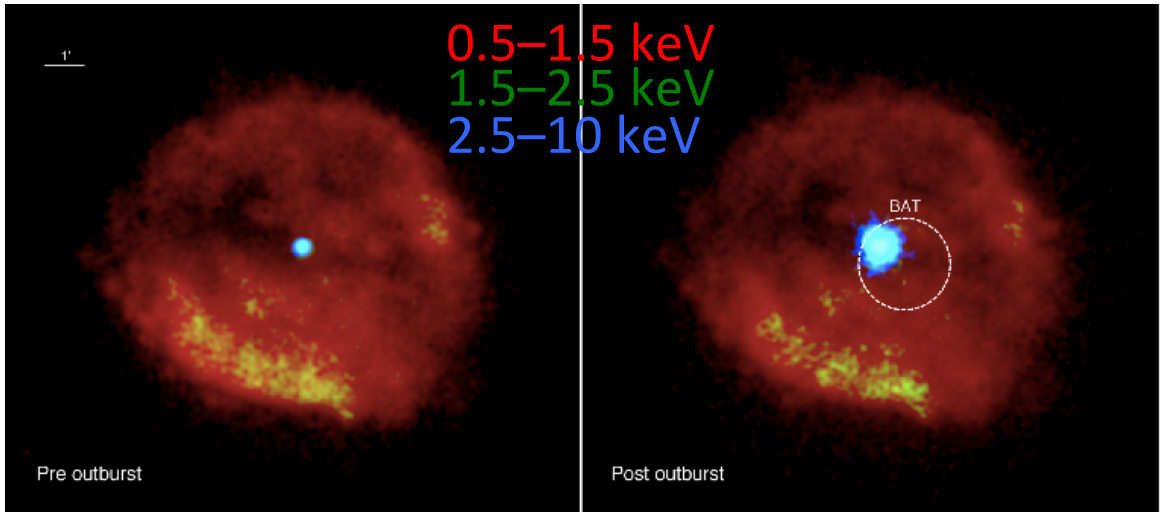

(2012)

INTEGRAL (2002)

AGILE (2007)

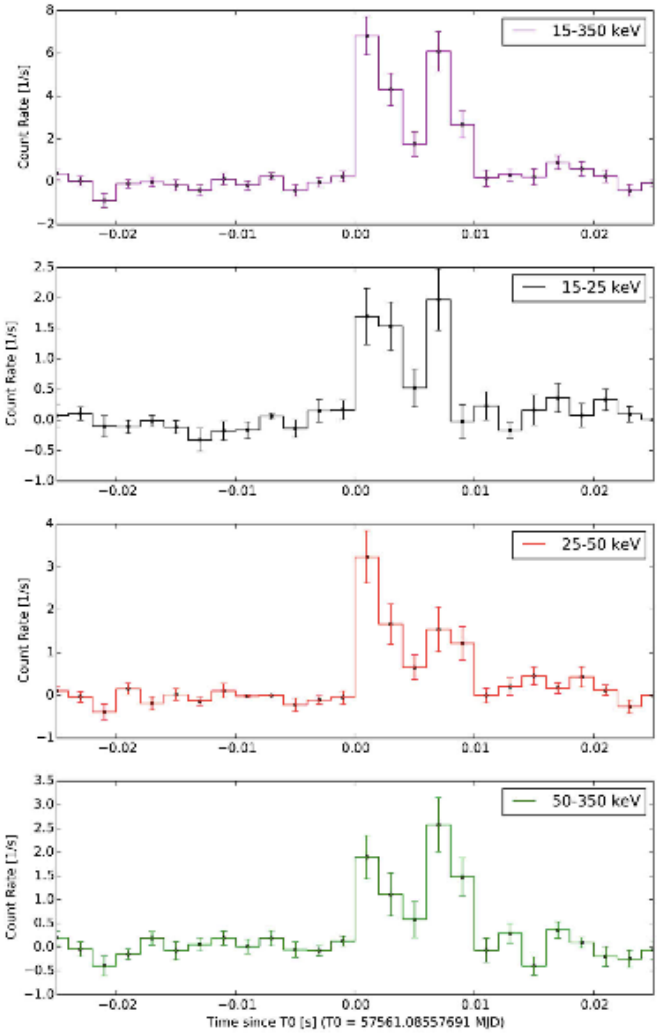
ASTROSAT (2015)


# Evidence for the magnetar nature of 1E 161348−5055 in RCW 103



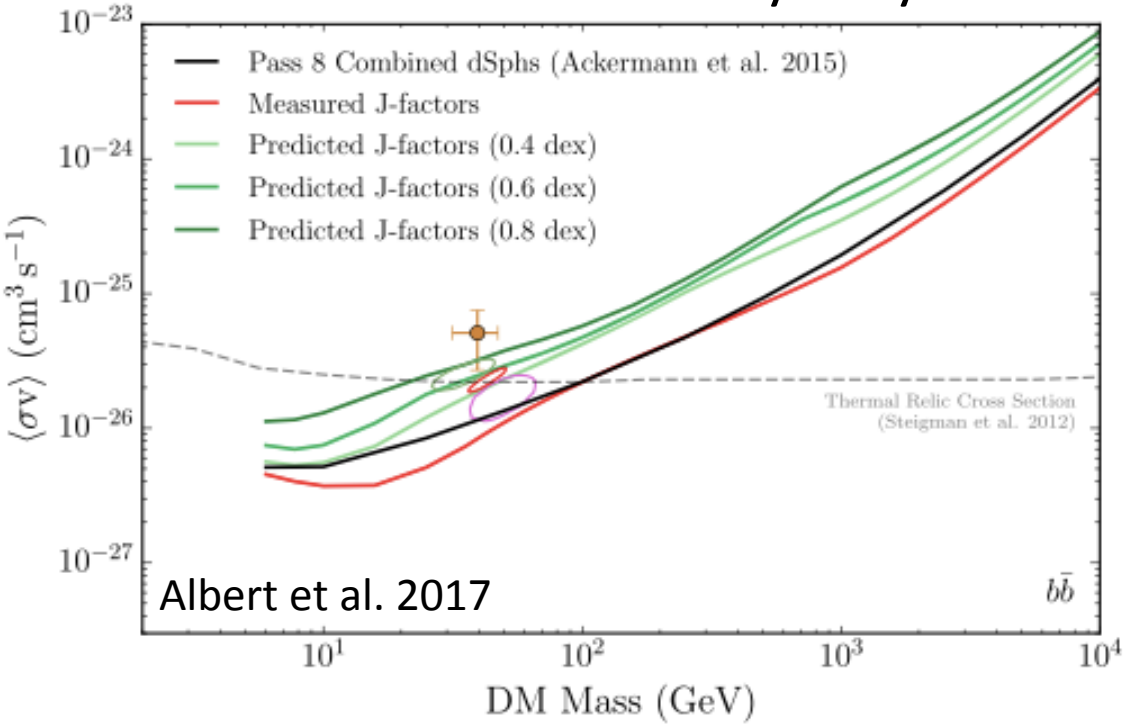

*Swift*/XRT image of the SNR RCW 103,

D'Ai et al. 2016

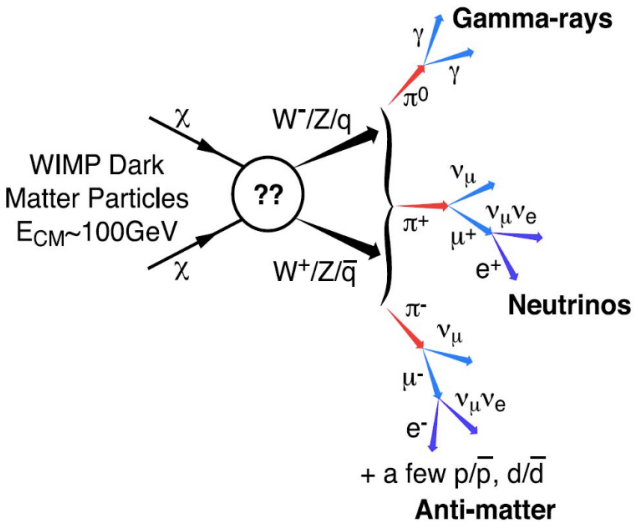


**Fermi** Gamma-ray Space Telescope

# Search for Dark Matter in Milky Way Satellites

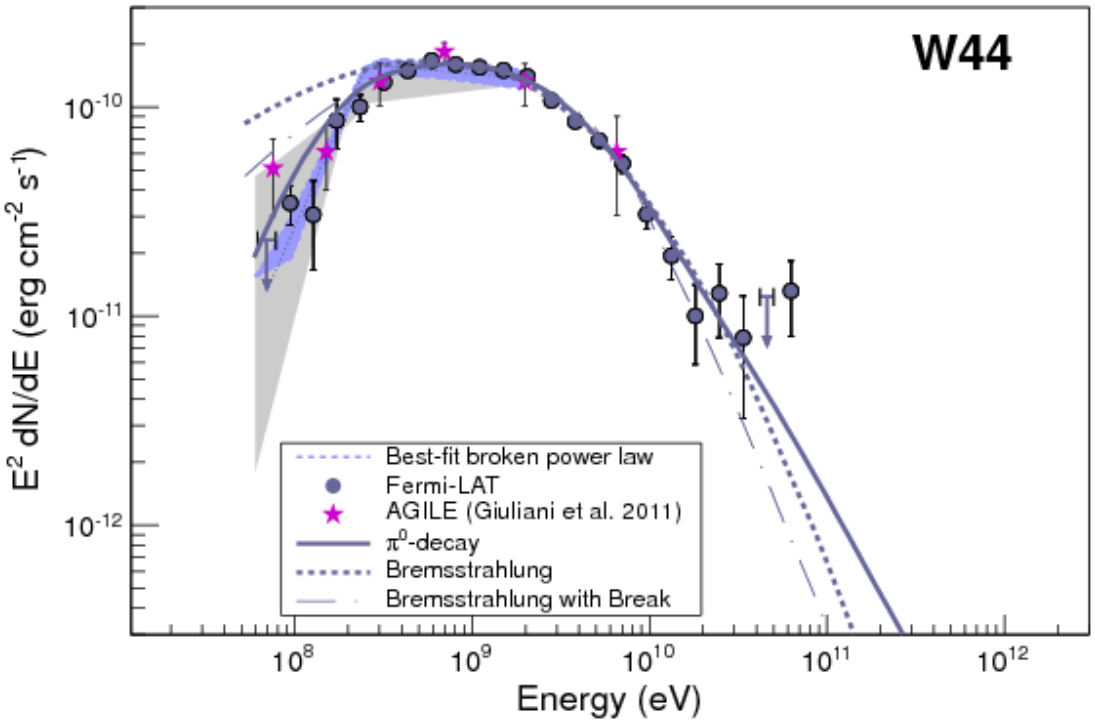


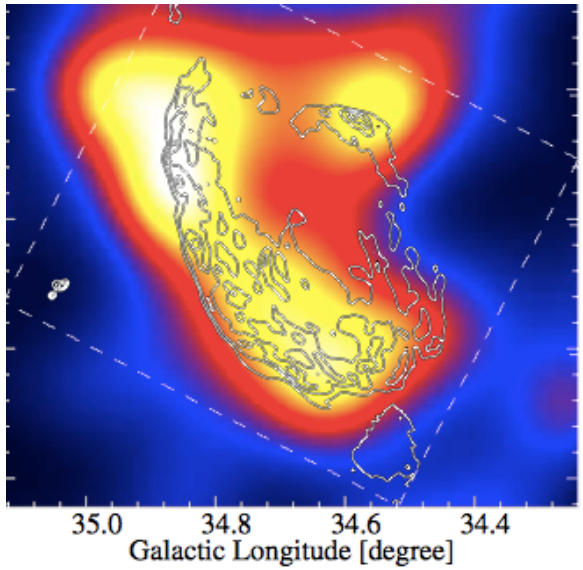

Albert et al. 2017




Baltz et al. 2008

Fermi Gamma-ray Space Telescope

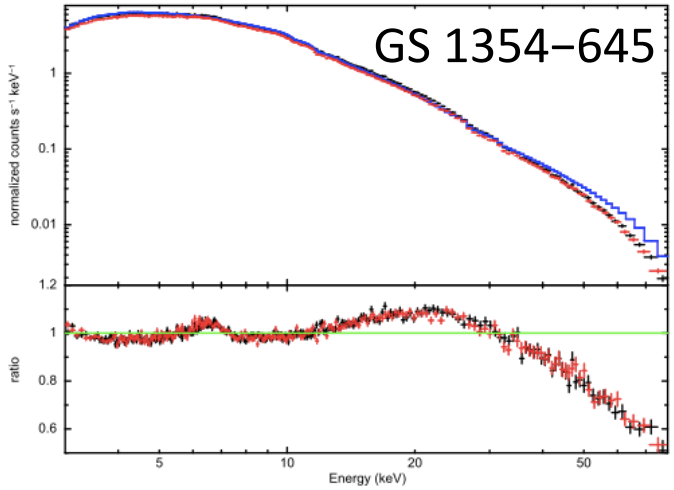



[Detection of the Characteristic Pion-Decay Signature in Supernova Remnants - Fermi-LAT Collaboration (Ackermann, M. *et al.*) Science 339 (2013) 807]

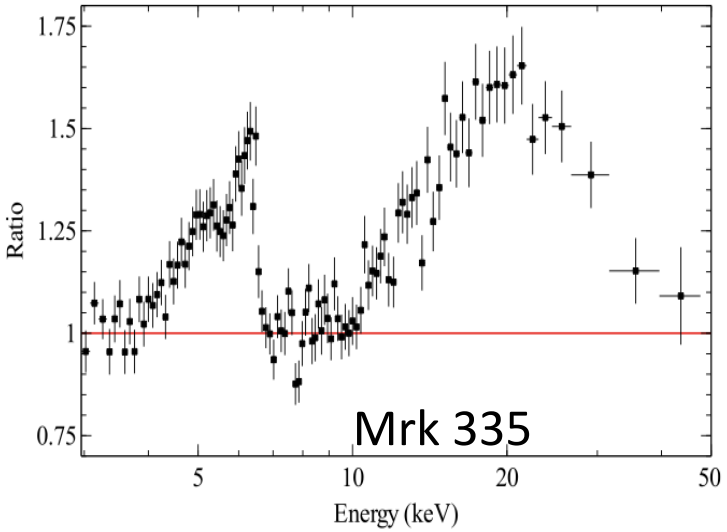
NuSTAR Bringing the High Energy Universe into Focus

# Constraints on Black Hole Spins and Accretion Flows




$$a = cJ/GM^2 \geqslant 0.98$$

El Batal et al. 2016

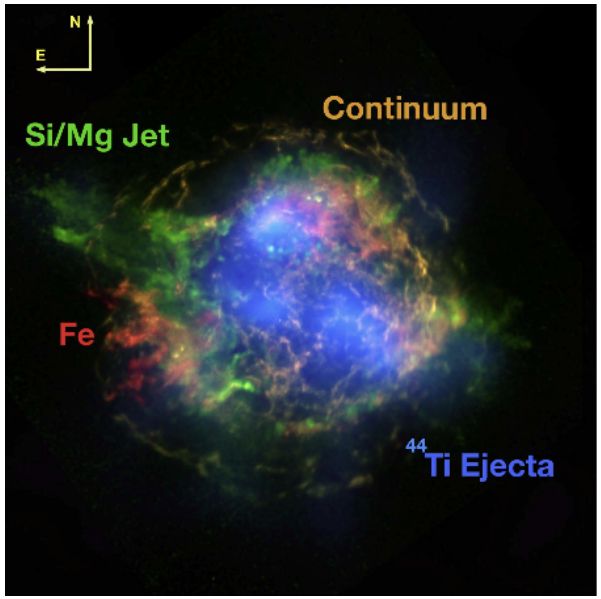



$$a \geq 0.9$$

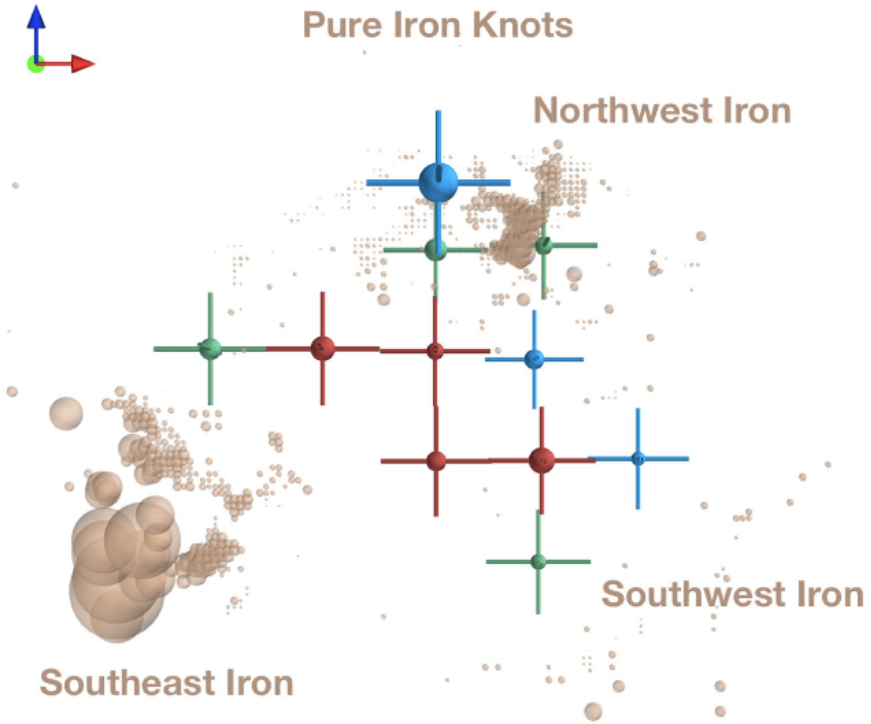
Parker et al. 2014

NuSTAR Bringing the High Energy Universe into Focus

# THE DISTRIBUTION OF RADIOACTIVE $^{44}$Ti IN Cas A




Grefenstette, B. W. et a. 2017



# Response to PCOS Call for White Papers on Probe Missions

| Name | Energy Band | Science |
|---|---|---|
| TAP<br>Camp et al. | X-ray | Epoch of reionization from high-z GRBs and SNs, survey of the X-Ray sky, GW counterparts |
| LOFT-P<br>Wilson-Hodge et al. | 2-30 keV | Strong gravity and BH spins, mass and radius of accreting neutron stars, surveying the dynamic X-Ray sky, multi-messenger studies |
| HEX-P<br>Harrison et al. | 2-200 keV | Resolve X-Ray background, evolution of black hole spin, faint X-ray populations in nearby galaxies |
| AMEGO<br>McEnery et al. | 0.2-10 GeV | Time-domain GW counterparts, improved MeV surveying, nuclear line emission |
| APT<br>Buckley et al. | 100 MeV-50 GeV | Dark matter, all-sky transient survey, GW counterparts |
| GreatOWL<br>Mitchell et al. | Cosmic Rays | Nature of ultra-high energy cosmic rays, GZK-induced neutrinos |

https://pcos.gsfc.nasa.gov/physpag/probe/PhysPAG_Response_v3.pdf

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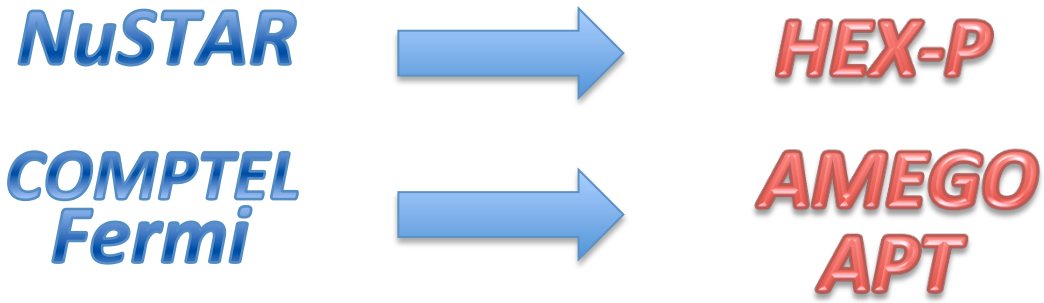

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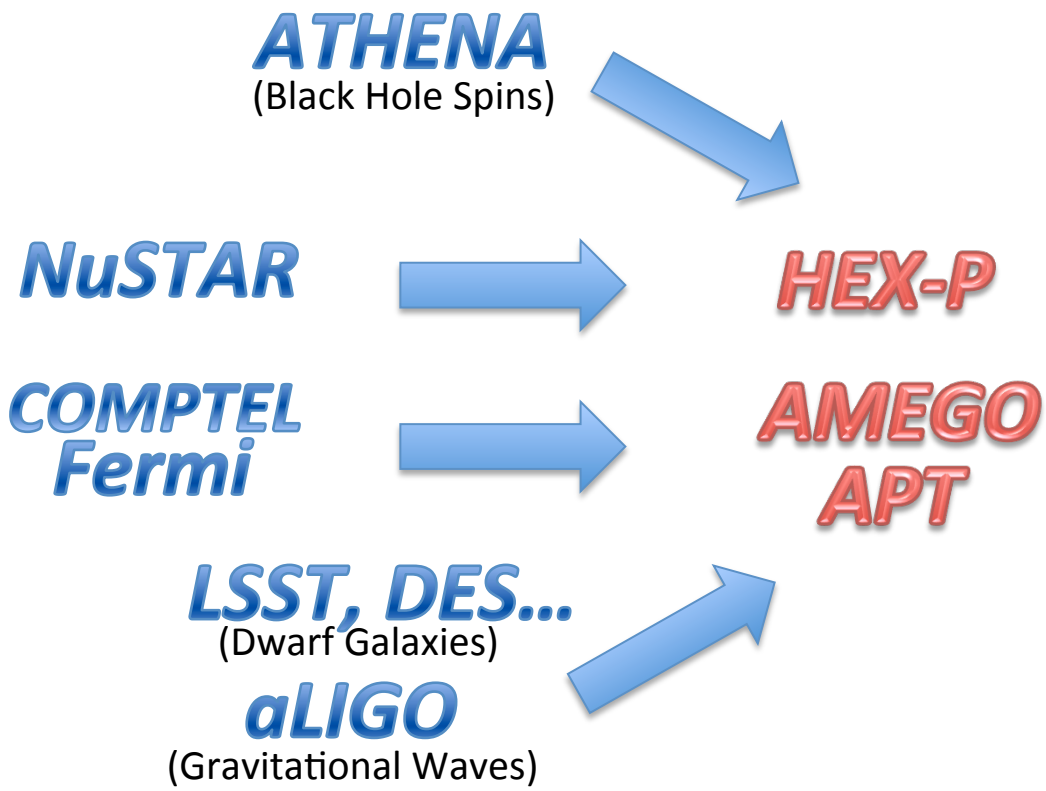


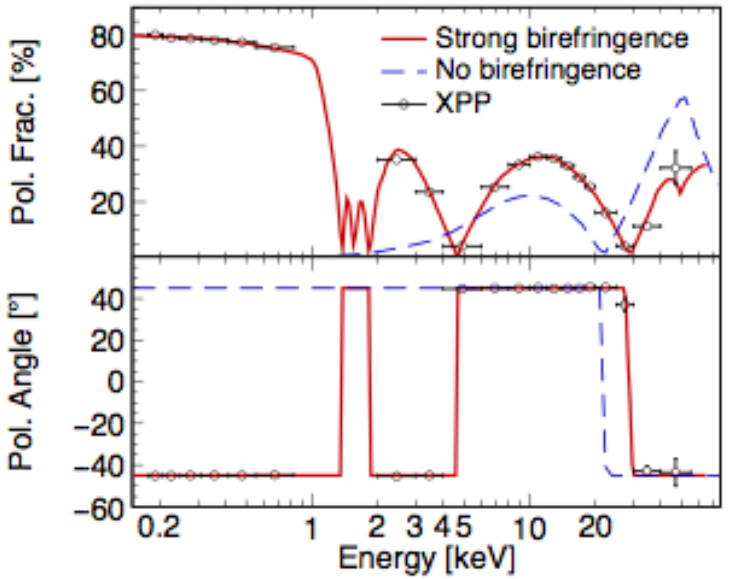
# X-ray and Gamma-Ray Polarization

AMEGO

XPP

Strong field Quantum Electrodynamics
Lorentz Invariance
CPT Symmetry

Simulations of 240 ksec Her X-1 Observation with the X-ray Polarization Probe




Krawczynski, Kislat, et al. 2016

# Upcoming Activities of the Gamma-SIG

**Session K9: Mini-Symposium: Gamma-Ray Science Interest Group**

Show Abstracts

Sponsoring Units: DAP
Chair: Henric Krawczynski, Washington University in Saint Louis
Room: *Roosevelt 1*

| | |
|---|---|
| Sunday, January 29, 2017<br>1:30PM - 1:42PM | K9.00001: STROBE-X: X-ray Timing & Spectroscopy on Dynamical Timescales from Microseconds to Years<br>Paul Ray , Colleen Wilson-Hodge , Keith Gendreau , Deepto Chakrabarty , Marco Feroci , Thomas Maccarone , Zaven Arzoumanian , Ron Remillard , Kent Wood , Chris Griffith<br><br>Preview Abstract |
| Sunday, January 29, 2017<br>1:42PM - 1:54PM | K9.00002: The High Energy X-ray Probe (HEX-P)<br>Fiona Harrison<br><br>Preview Abstract |
| Sunday, January 29, 2017<br>1:54PM - 2:06PM | K9.00003: Ex Luna Scientia: The Lunar Occultation Explorer (LOX)<br>Richard Miller<br><br>Preview Abstract |
| Sunday, January 29, 2017<br>2:06PM - 2:18PM | K9.00004: Depicting the Gamma-ray Realm with the All-sky Medium Energy Gamma-Ray Observatory (AMEGO)<br>Sara Buson<br><br>Preview Abstract |
| Sunday, January 29, 2017<br>2:18PM - 2:30PM | K9.00005: The Advanced Patricle-astrophysics Telescope (APT) Mission Concept<br>James Buckley<br><br>Preview Abstract |
| Sunday, January 29, 2017<br>2:30PM - 2:42PM | K9.00006: The Cherenkov Telescope Array: A Very-High-Energy Complement to Future High-Energy Space Missions<br>David A. Williams<br><br>Preview Abstract |

# Upcoming Activities of the Gamma-SIG


Proposed Special Session on X-ray and Gamma-Ray Polarimetry (org. Tomsick & Krawczynski)
Tentative Program:
- INTEGRAL and eASTROGRAM (P. Laurent)
- IXPE (M. Weisskopf, tbc)
- XIPE (tbd)
- POLAR (N. Produit)
- X-Calibur/XPP (F. Kislat)
- COSI – (S. Boggs)
- LEAP/POET/GRAPE (M. McConnell)
- AMEGO (L. Hays)
- Astrosat (S. Vadawale)
- Theory (tbd)

https://aas.org/meetings/head15

# Preparation for Decadal Survey

D.12 ASTROPHYSICS PROBES MISSION CONCEPT STUDIES

**NOTICE: Amended on August 16, 2016. This amendment creates a new opportunity in ROSES-16 in this program element, D.12 Astrophysics Probe mission concept studies. A Preproposal teleconference will occur on September 13, 2016, 1-2 pm. The dial in number for the teleconference will be 877-951-7311, passcode 4496156. Any new information that comes out of questions and answers from the teleconference or questions sent directly to the NASA point of contact will be posted in a FAQ on the NSPIRES web page for this program element. Notices of Intent are requested by September 16, 2016, and the due date for proposals is November 15, 2016.**

- Journal and Conference Papers about science potential.
- White papers.
- [Roadmap].