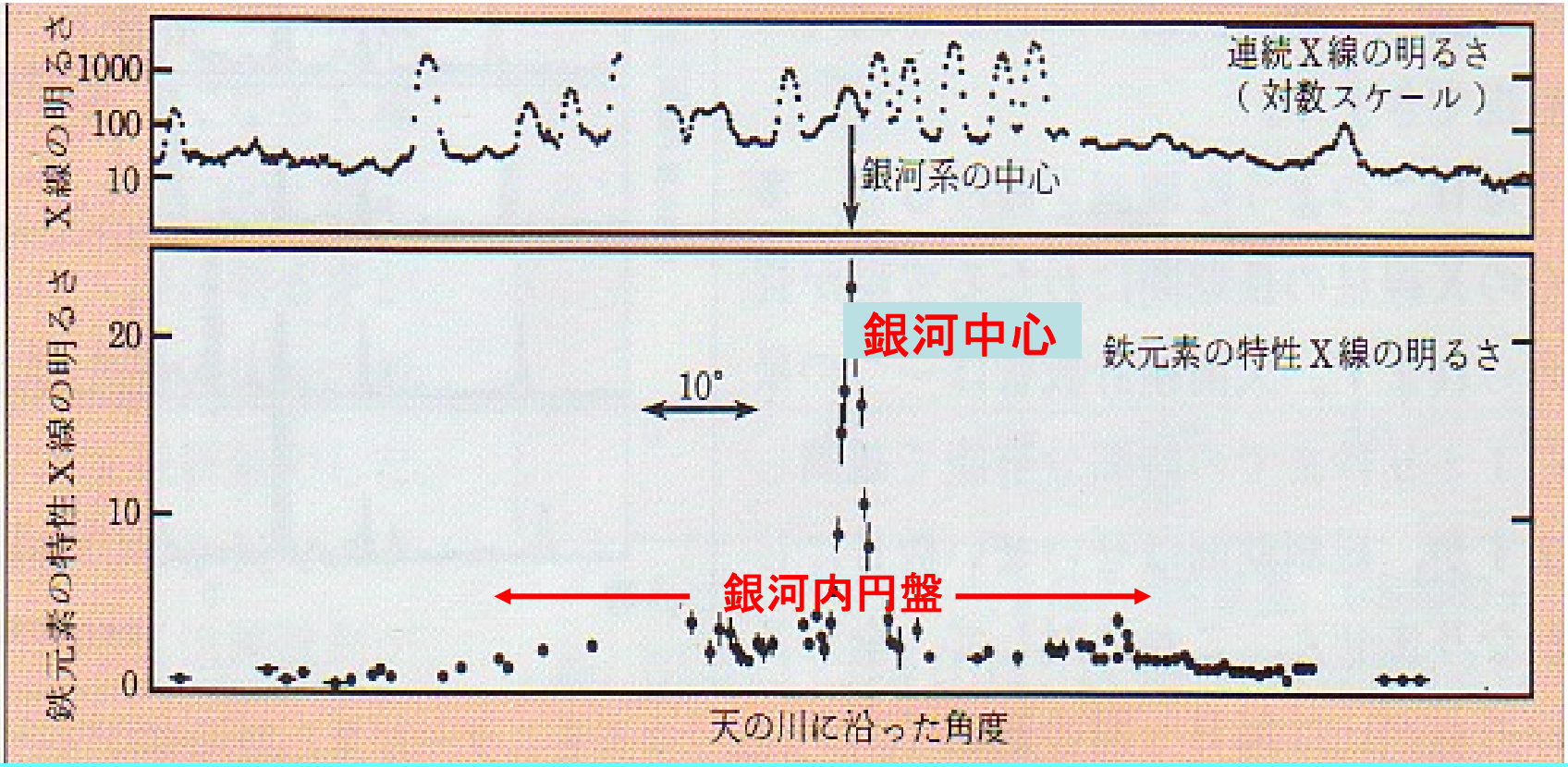
大規模な超高温プラズマ(約1億度)を発見している。
ーその意味と課題ー



隠れた(電波で暗い)SNRが銀河面に大量にある？

But :高温度のSNRは発見できず、その代わり

非熱的X線SNRの発見　(ASCA → Chandra, XMM)

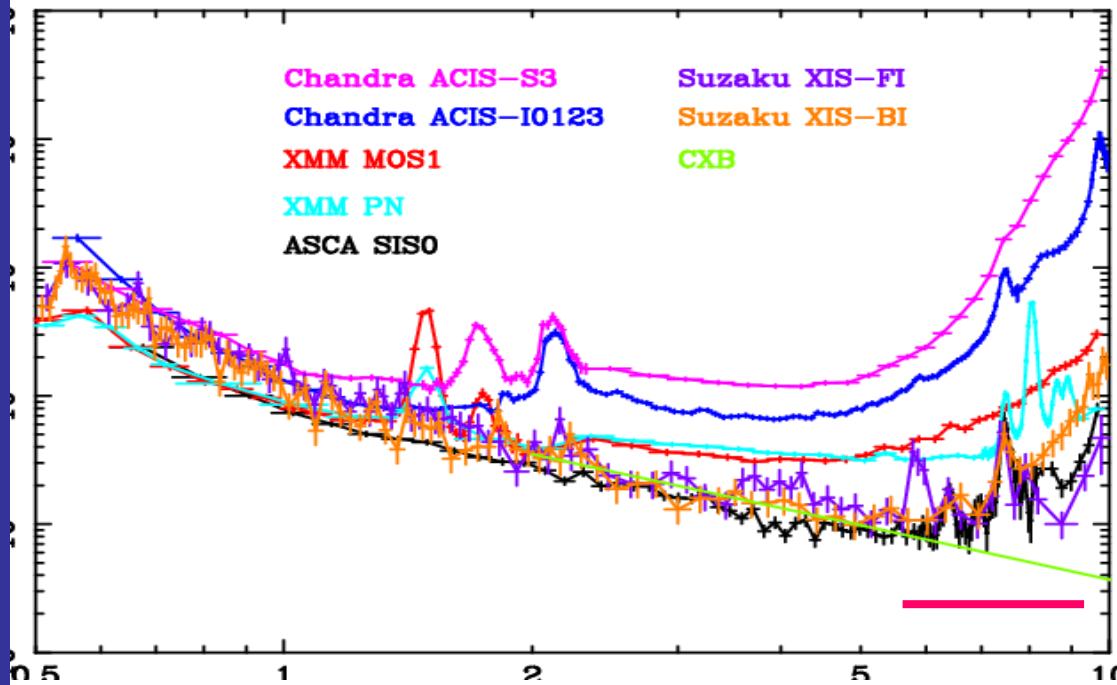
HESS:未同定Diffuse:非熱的X線SNR →「超高エネルギー宇宙」

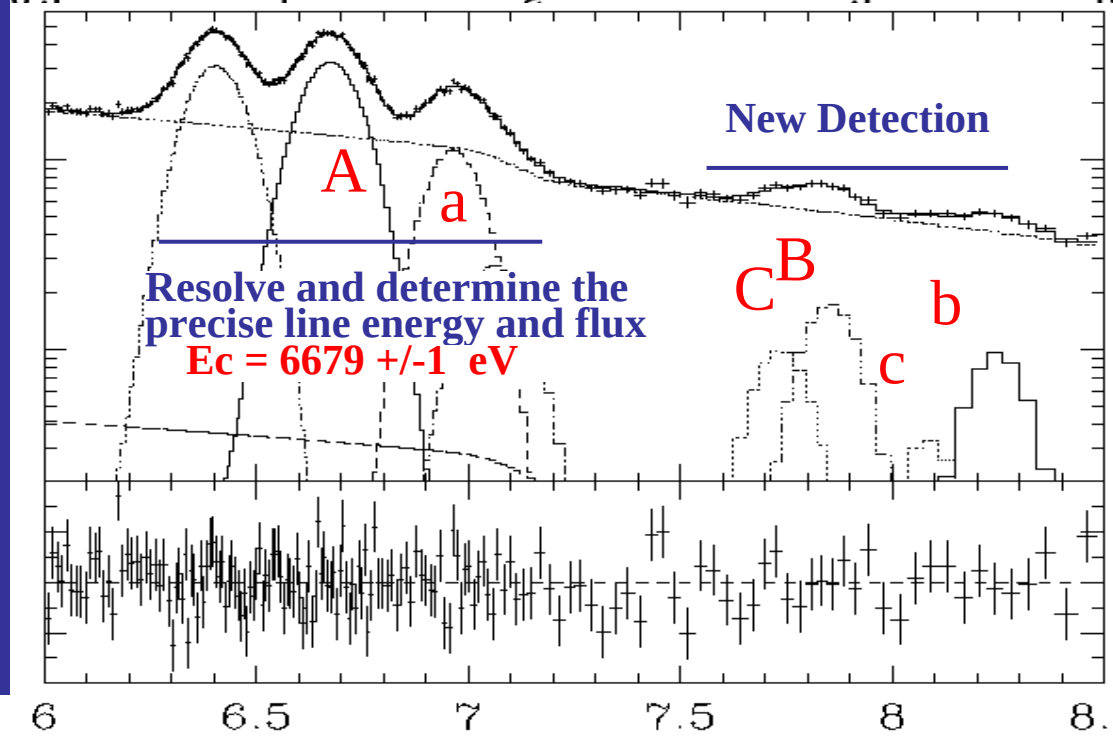
Suzaku/XIS

The best energy resolution and lowest background in 0.2-0.7 keV (C, N, O) and 5-10 keV (Fe, Ni) .

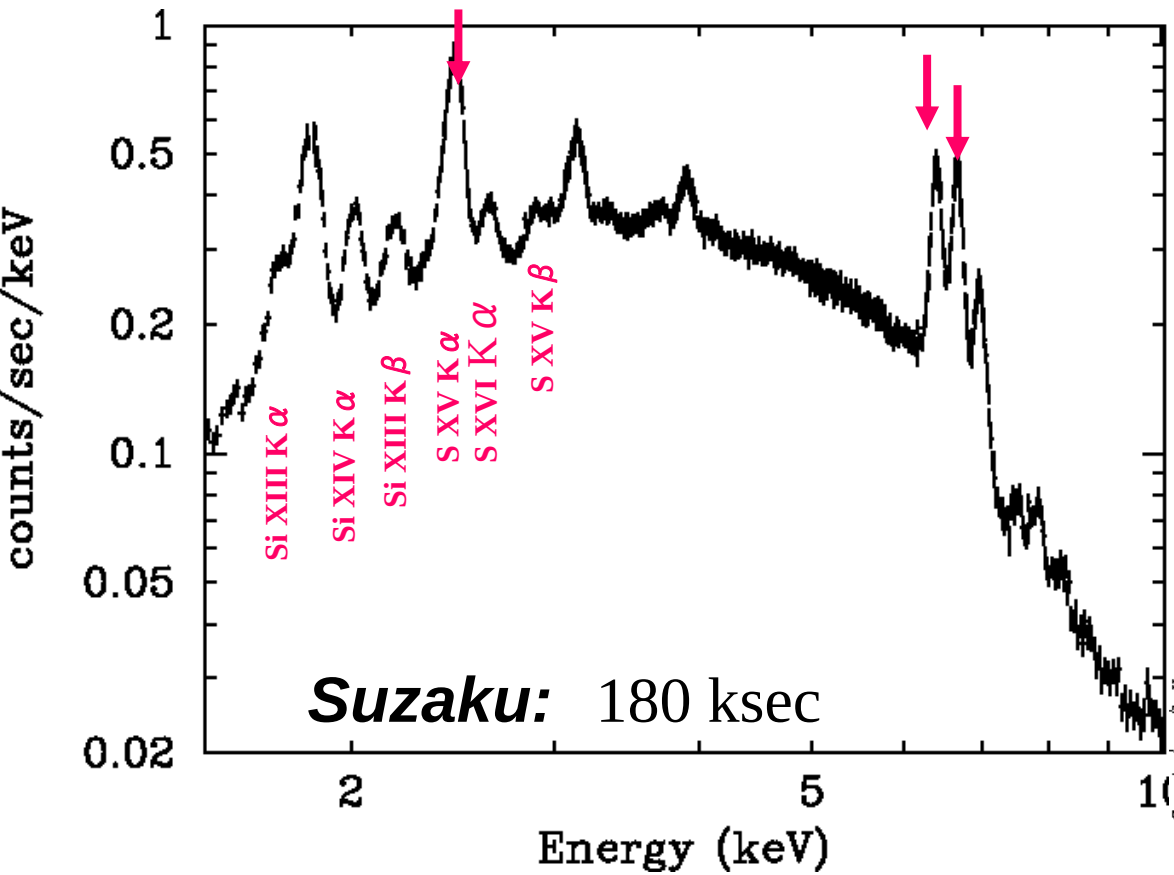
The Galactic Center & Plane Observations are the best Target for Suzaku.

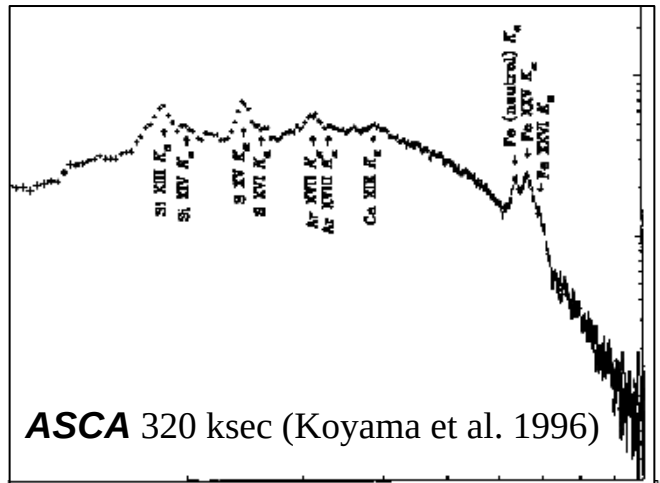
The results are beyond the established science.

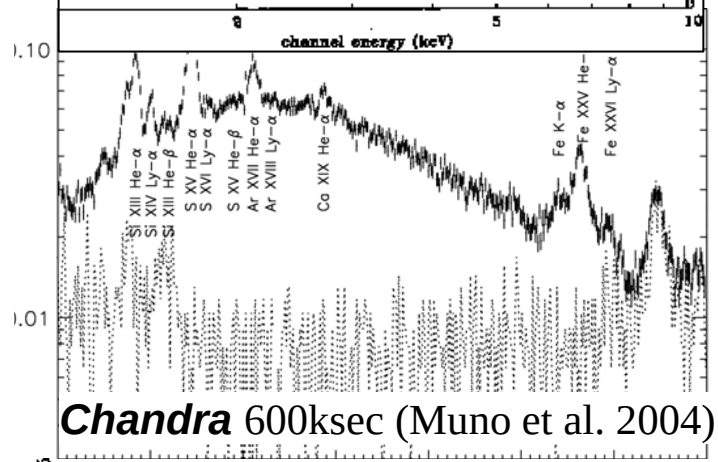


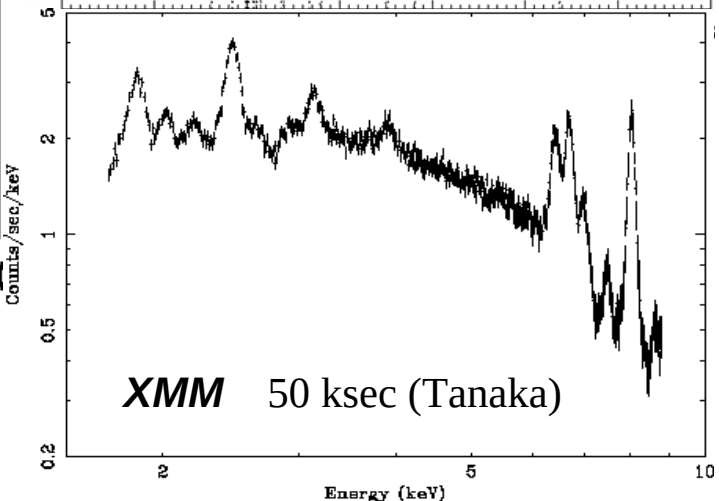


The Best Performance of XISs

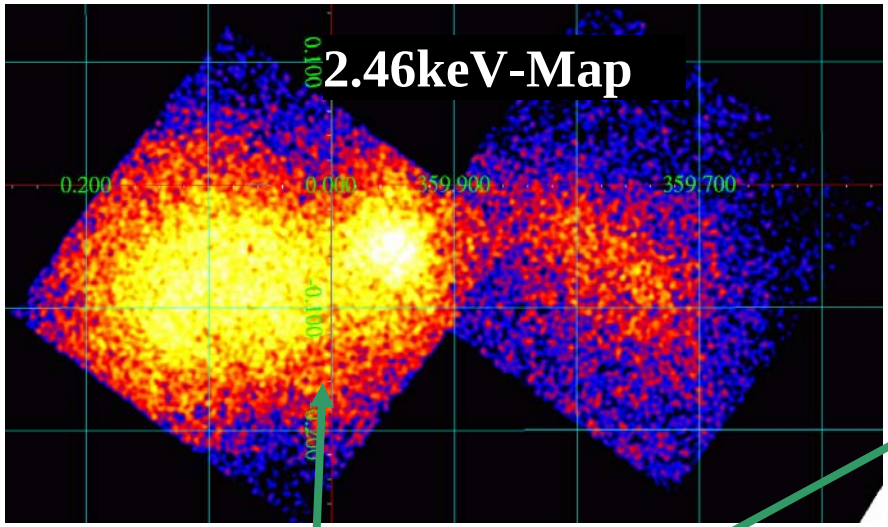


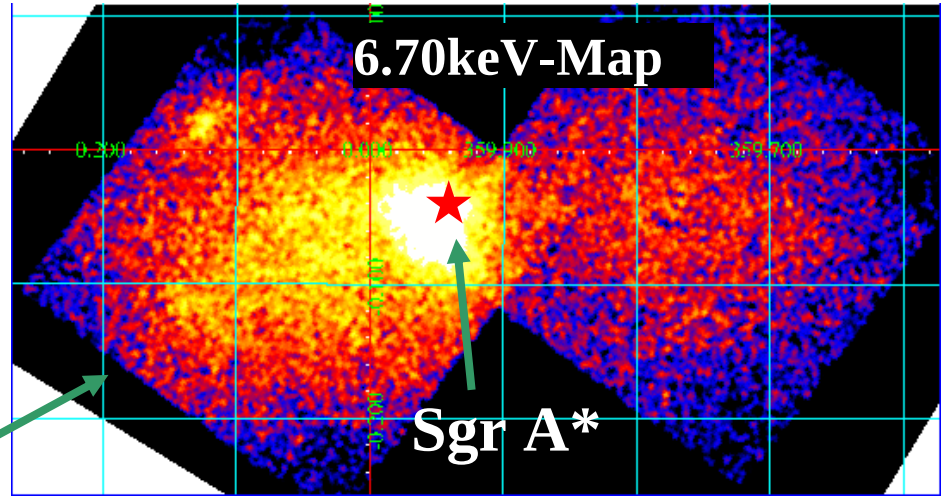


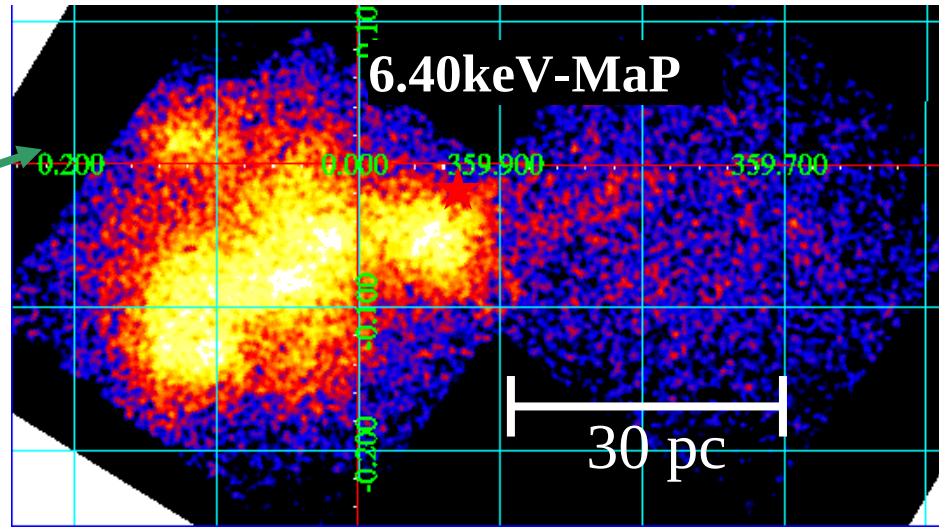


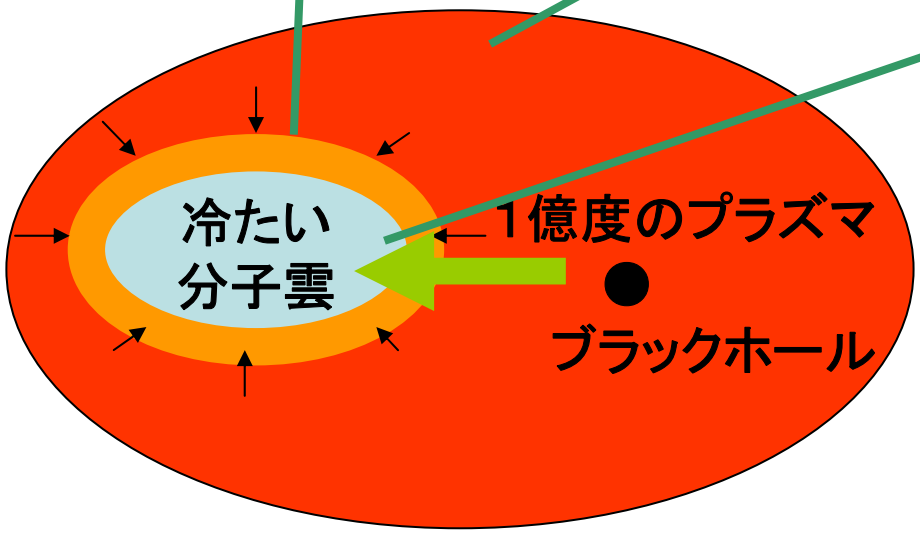


The Galactic Center Observed with Suzaku

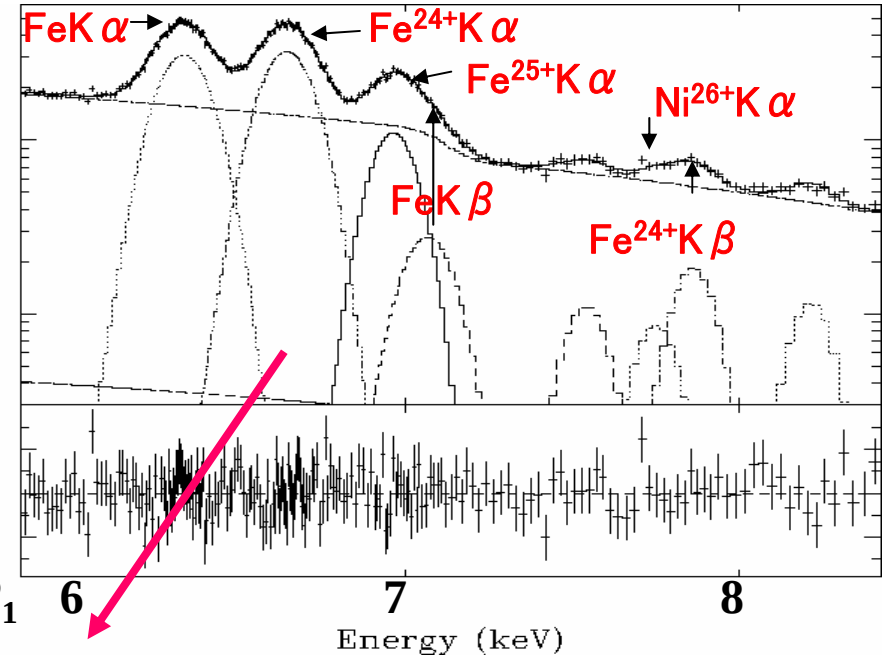


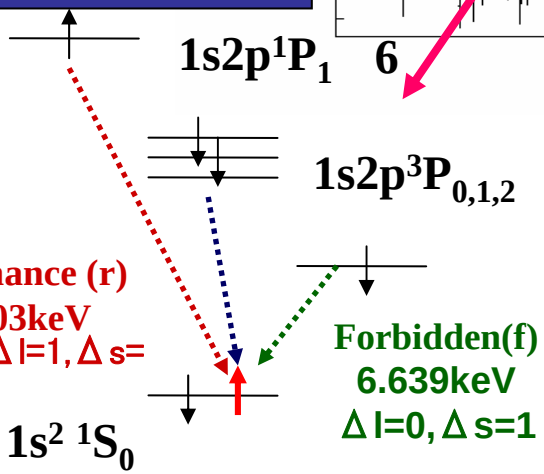


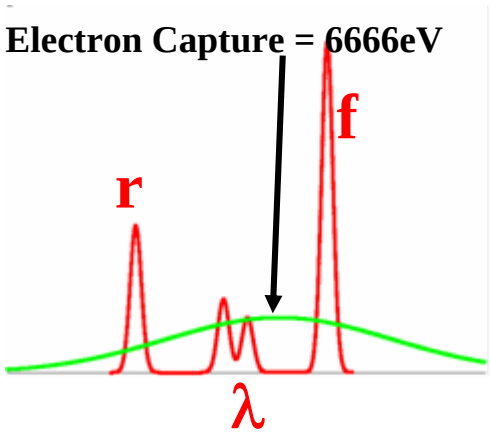


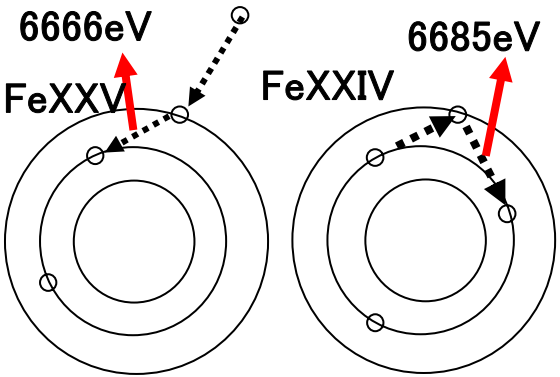


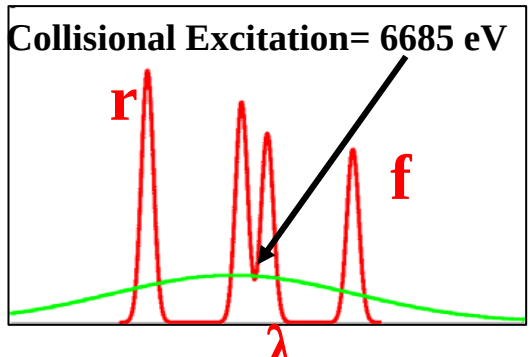
Name	Observed	Lab	⊿(eV)
S Lyα	2622.4+3.6−2.7	2621.6	0.8
FeLyα	6969.5+2.8−2.1	6965.7	3.8
Mn Kα	5899.6+1.7−0.4	5895.1	4.5











He-like Fe Kα =6679 eV: Close to 6685eV(δ =6eV) : Collisional Excitation

Ionization Temperature

Fe Kα H–like/He-like = 0.34 +/- 0.01 : kTi=6.5 keV +/- 0.1keV

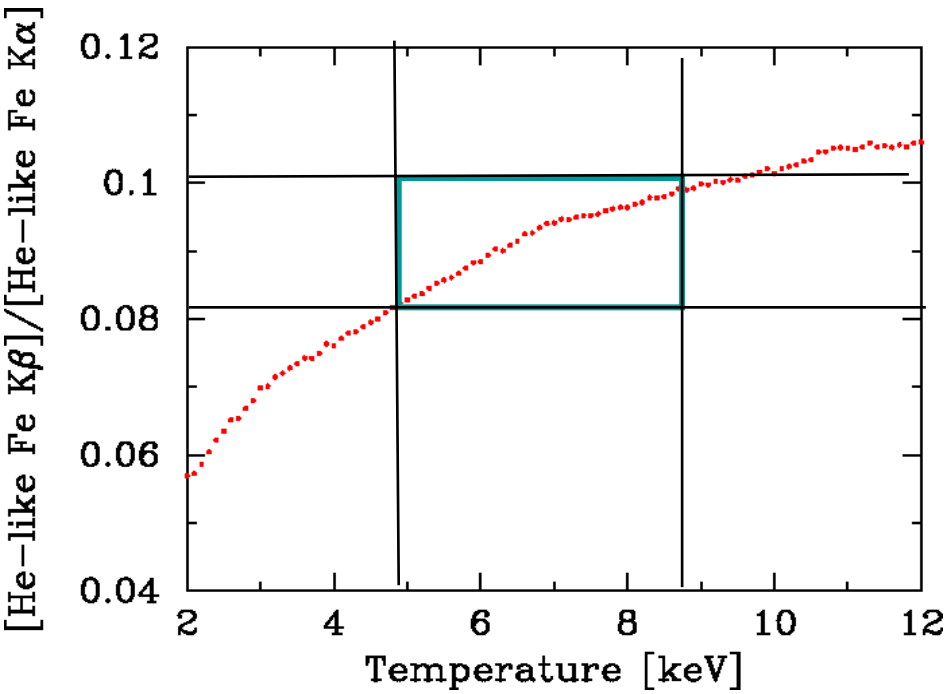
Fe Kβ H-like/He-like = 0.66 +/- 0.15: kTi=5.1 keV + 1.5 -1.0 keV

Ni Kα H-like/He-like = 0.4 +/- 0.2: kTi= 9.3 keV +1.6 -2.5 keV

Electron Temperature

○ He-like Fe Kβ/Kα = 0.09 +/- 0.01: kTe=6.2 keV +3 -1keV

H-like Fe Kβ/Kα = 0.18 +/- 0.03 : kTe> 6.5 keV (lower limit)

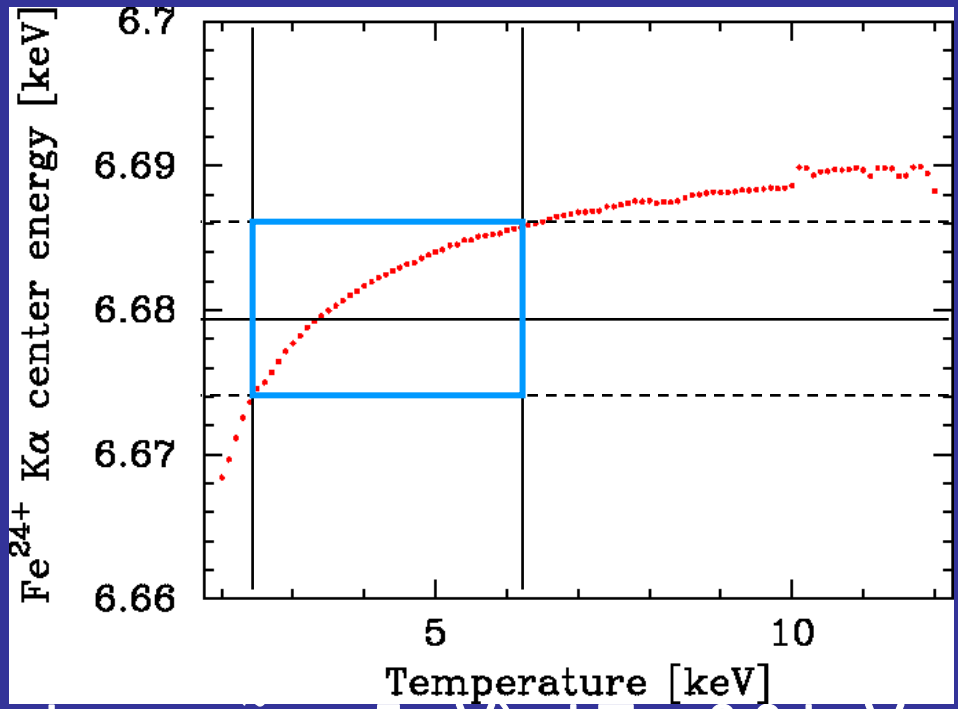


All the results are consitent if the Plasma is kTi ~ kTe=6.5 keV.

This methodology to determine the electron temperature (kTe) at the Fe energy is possible only with Suzaku. Our new method constrains the Continuum shape, hence can separate the Non-thermal components.

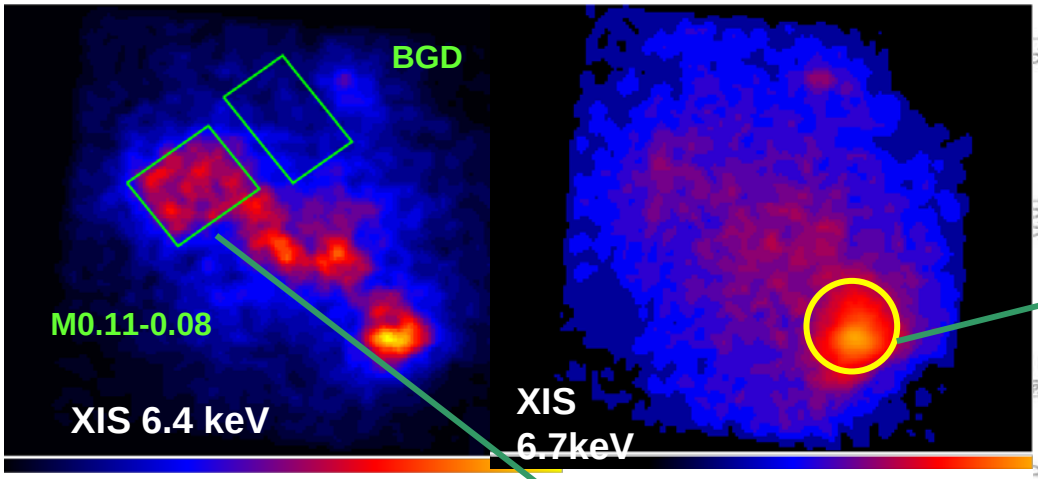
The G-ratio (Forbidden + Inter-combination / Resonance) of Collisional Excitation (CE) is smaller than that of Charge Exchange (electron capture) (EC), the Center Energy with XIS should be higher in CE. The laboratory value for CE is 6685eV, while EC is 6666eV. In fact, APEC Model of 6-keV plasma gives the center energy at 6685eV.
Ec = 6679 eV +- 1 eV (Collisional Excitation is more likely).

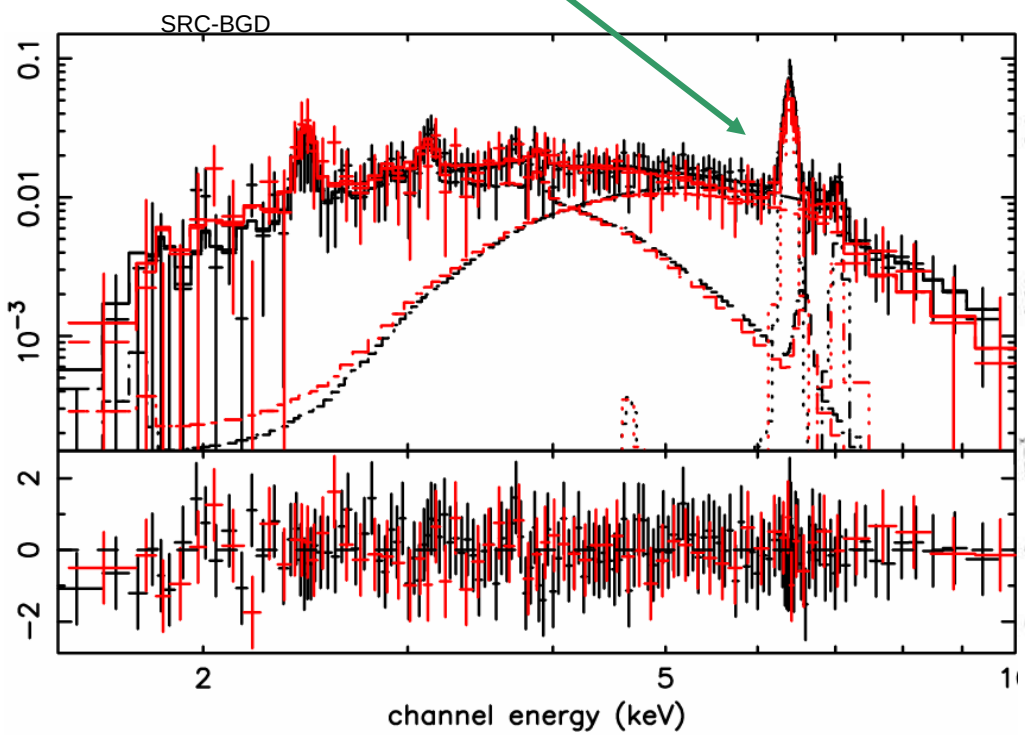
The G-ratio decreases as decreasing plasma temperature. Furthermore, it also decreases with temperature due to the contribution of satellite line. Thus we can constrain the plasma temperature kT using the center energy of A.
The result is:

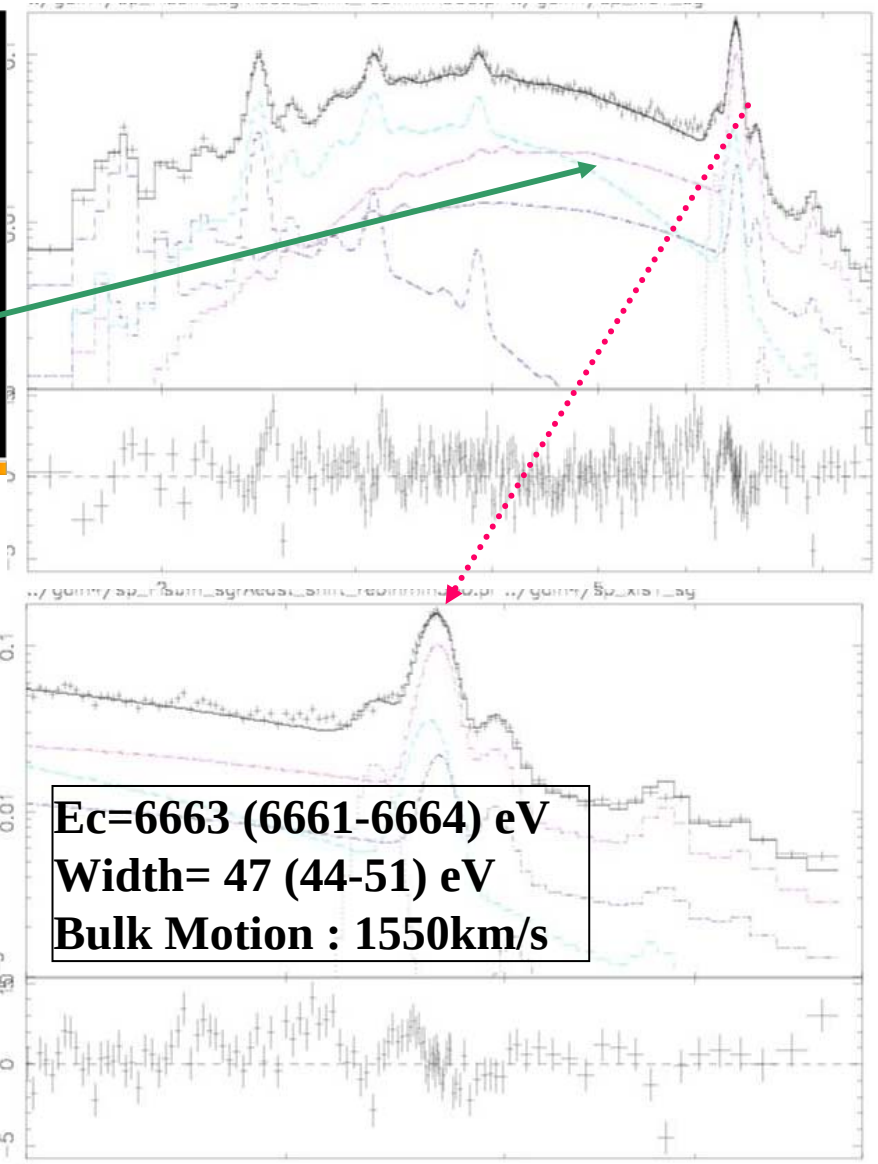


Ec= 6679 eV +/- 1 eV (Systematic error ~ +- 5 eV): kT = 3.2 keV +3 -1 keV. This is just the XRS science, hence our GC study make more clear strategy for the NexT.

Best Spectrum of Radio Arc & Sgr A East

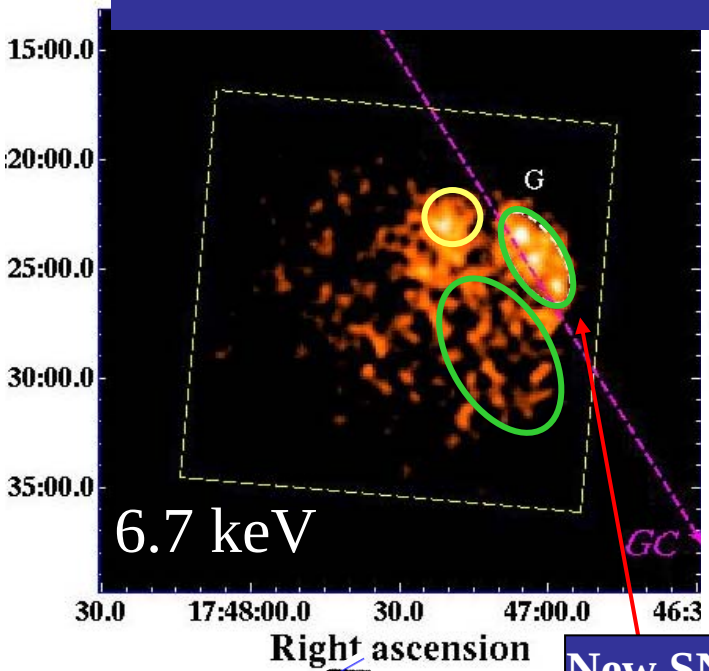


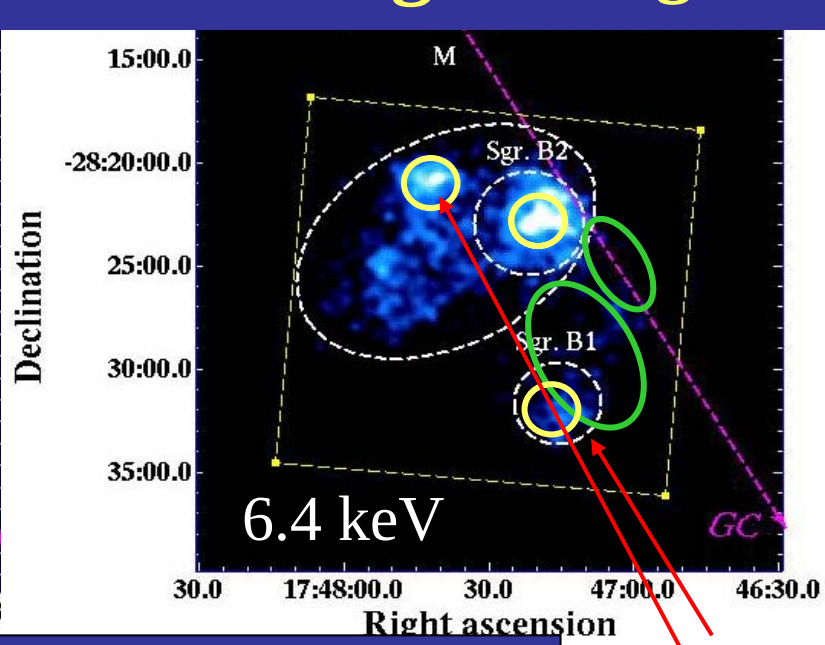




Ec=6663 (6661-6664) eV
Width= 47 (44-51) eV
Bulk Motion : 1550km/s

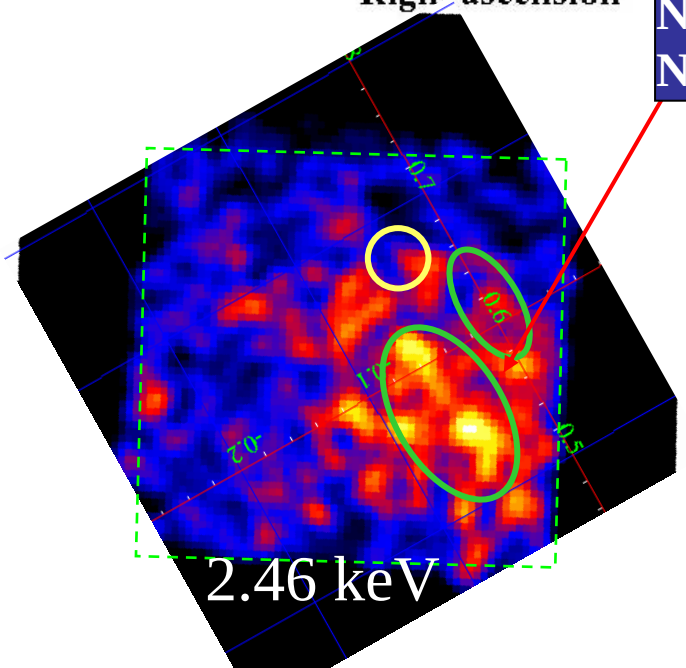
New Sources from the Sgr B Region

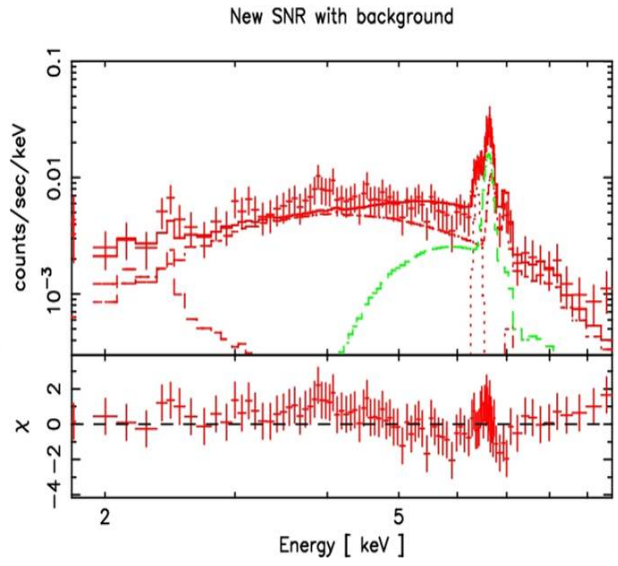


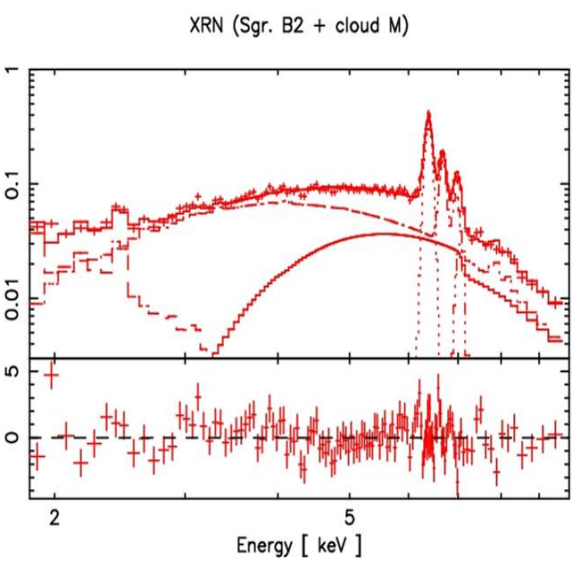


New SNR (Behind the Cloud)
New SNR（In front of the Cloud)

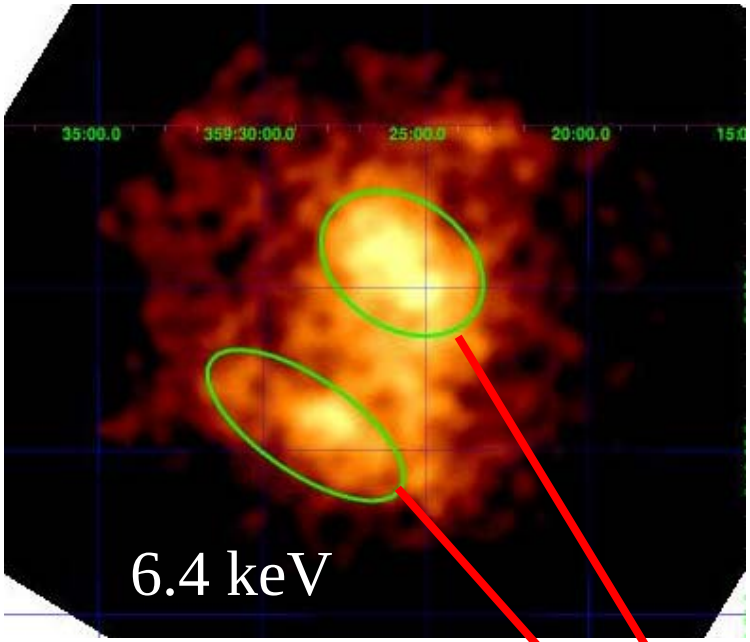
New XRNs

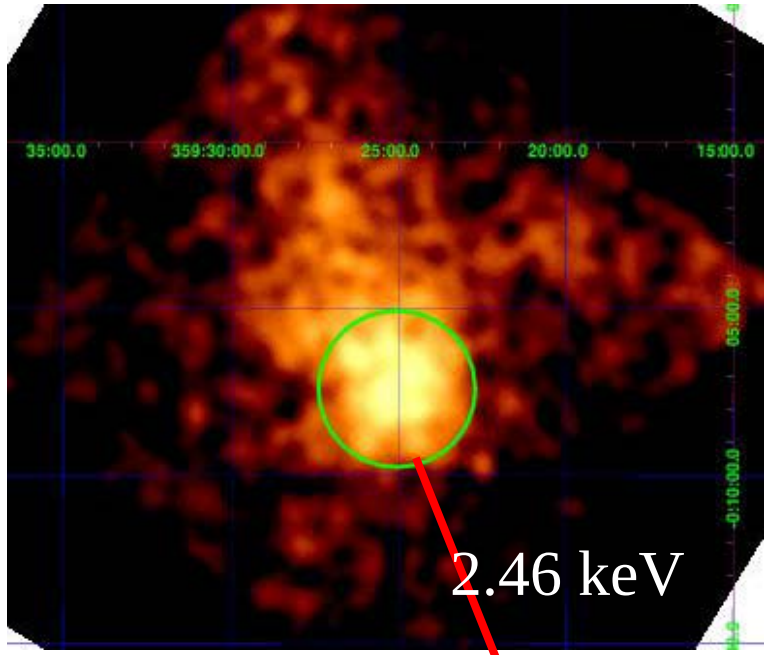






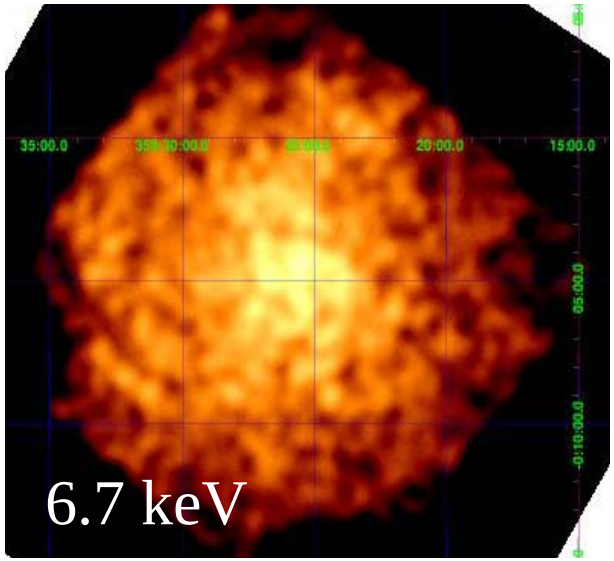
New Sources from the Sgr C Region

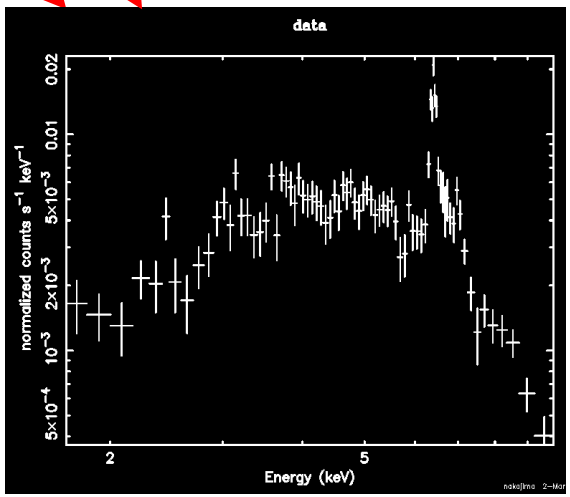


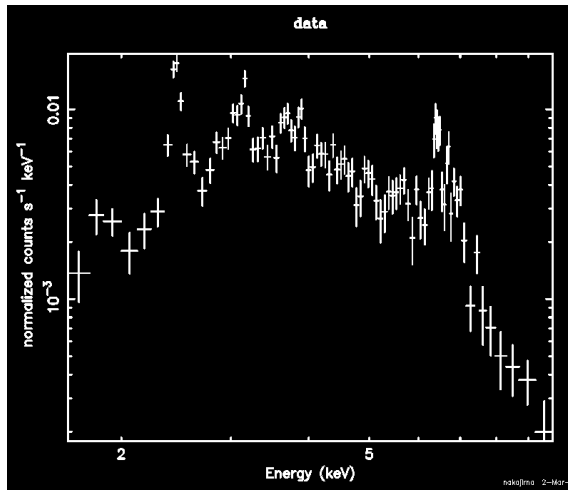


New XRNs

New SNR







6.7 keV , 2.46 keV Line Map

未発見の若い超新星残骸が続々

→ 銀河中心の高温プラズマ？

→ 宇宙線加速

6.4 keV Line Map

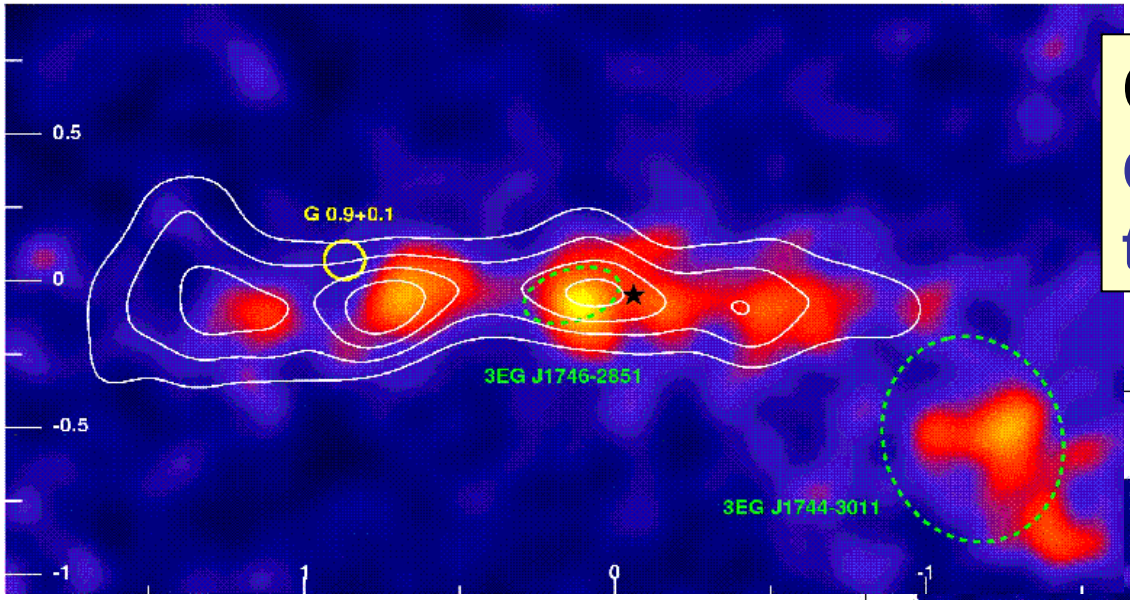
未発見のX線反射星雲が続々

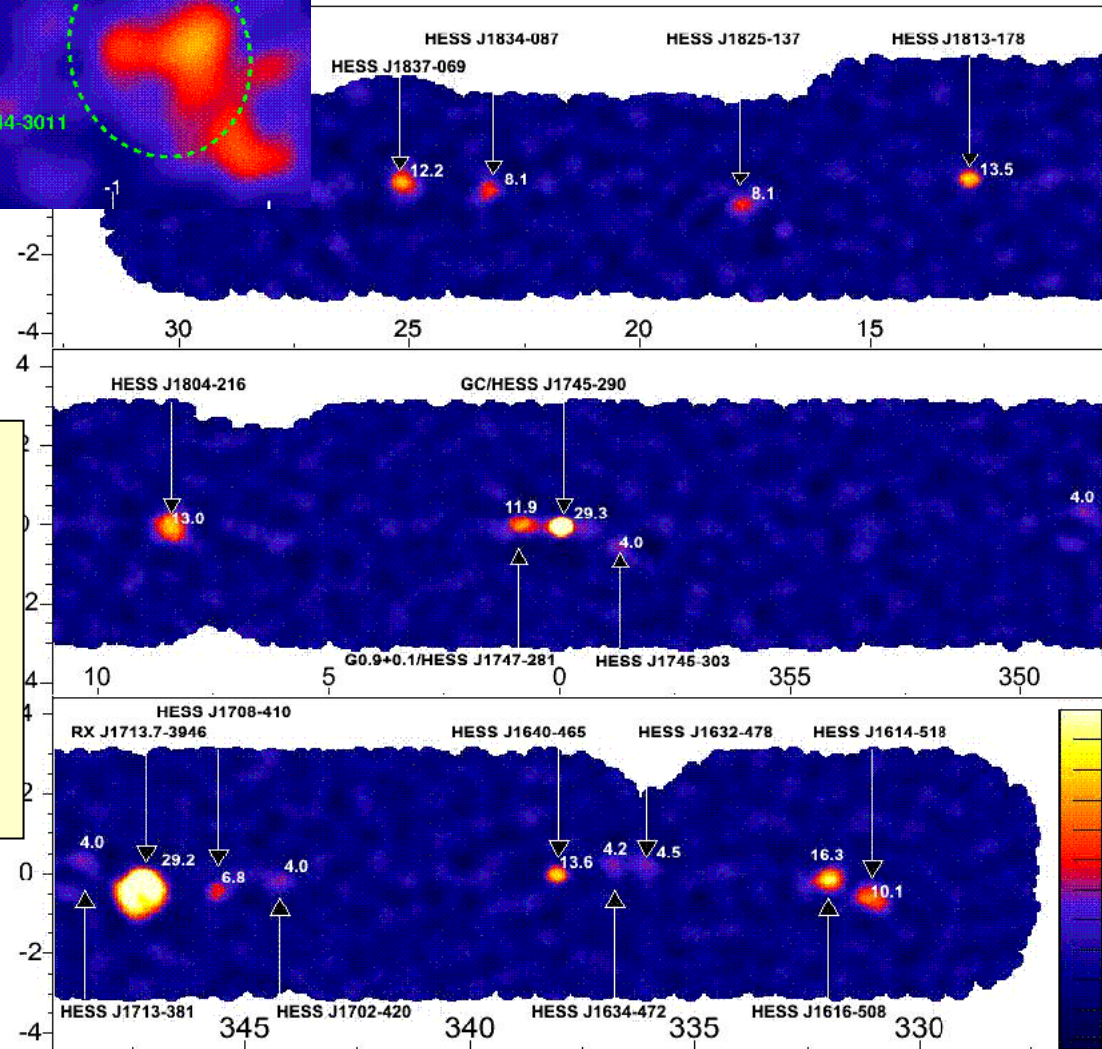
→ 銀河中心の過去の活動のX線こだま？

→ 高エネルギー粒子による励起？

Galactic Center

Good Correlation with the HESS-TeV Emission





Galactic Plane

No Correlation with the HESS-TeV Sources

→Deeper Observations may reveal.

明月記

一條院寛弘
三年四月二日
葵酉 夜以降
騎官中有
大客星

1006年5月1日
おおかみ座に
超新星有り

The Extreme Universe in the Suzaku Era

Kyoto, Japan December 4 - 8, 2006

Diffuse X-ray Sources in Galaxies
- Extended Thermal X-rays
- Non-thermal X-ray/GeV/TeV Sources
- The Galactic Center and its Environments

X/Gamma-rays from Stars and Compact Objects in Galaxies
- White Dwarf and Neutron Star Binaries
- Isolated Compact Stars
- Normal Stars, Planets and Nebula

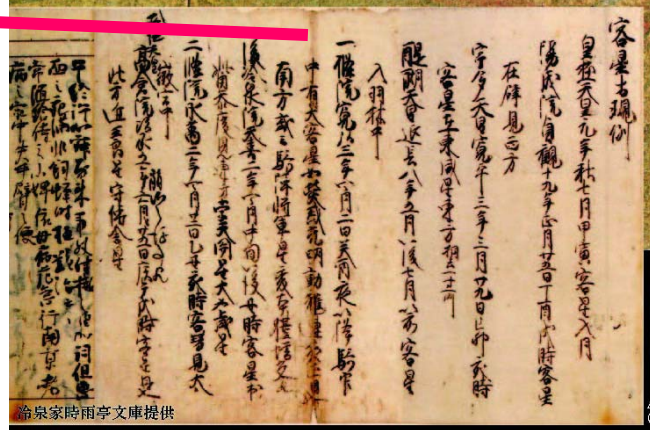
Structure and Evolution of Galaxies and Clusters
- Chemical Compositions and Evolutions
- Thermal and Non-thermal Structures

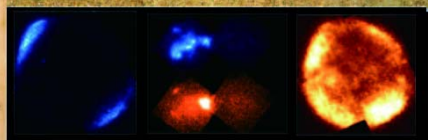
Stellar/Intermediate/Super Mass Black Holes
- Accretion Physics on Black Holes
- Outflow/Jets from AGNs and Micro-Quasars

Extremely High Energy Objects
- Gamma Ray Burst
- GeV/TeV Emissions
- Cosmic Rays and Neutrino

Special Session: "The millennium of SN 1006: Particle acceleration"

キトラ
古墳
壁画


冷泉家時雨亭文庫提供


Ancient Japanese record of guest stars
(Mei-Getsu-Ki, a Japanese national treasure)

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C. Done (U. Durham, UK)
A. Fabian (Cambridge, UK)
G. Hasinger (MPE, Germany)
J. Hughes (Rutger U., USA)
R. Kelley (GSFC/NASA, USA)
K. Koyama (Chair) (Kyoto U., Japan)
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