IACHEC Galaxy Clusters WG — 2025 Summary

International Astrophysical Consortium for High Energy Calibration

We study galaxy clusters as broad-band X-ray standard candles.

E. Miller (chair, XRISM, Hitomi, Suzaku/XIS)

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M. Bonamente

Y. Chen (Insight-HXMT, Einstein Probe FXT)

L. David (Chandra)

J. de Plaa

G. Dewangan (ASTROSAT)

K. Forster (NuSTAR)

F. Gastaldello (XMM-Newton/EPIC)

C. Grant (Chandra/ACIS)

K.D. Kuntz (ROSAT)

K. Madsen (NuSTAR)

C. Markwardt (NICER)

H. Matsumoto (XRISM/Xtend, Hitomi/SXI, Suzaku/XIS)

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A. Read (XMM-Newton/EPIC-MOS)

G. Schellenberger (XMM-Newton/EPIC, Chandra/ACIS)

S. Snowden (XMM-Newton/EPIC-MOS)

M. Stuhlinger (XMM-Newton/EPIC)

I. Valtchanov (XMM-Newton/EPIC)

N-J. Westergaard (NuSTAR)

D. Wik (NuSTAR)

H. Zhao (Insight-HXMT)

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Contact milleric@mit.edu to join

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Galaxy Clusters WG — 2025 Agenda

9:00 — **Itsuki Aihara**, “Cross-Calibration of XRISM Resolve and Xtend: I. Temperature Measurements in Nearby Galaxy Clusters”

9:20 — **Kazunori Suda**, “Cross-Calibration of XRISM Resolve and Xtend: II. Line Ratio and Continuum-Based Temperature Measurements”

9:40 — **Daniel Wik**, “Cross-Calibration Comparisons using Galaxy Cluster Emission from NuSTAR, Chandra, XMM-Newton, Suzaku, and XRISM”

10:00 — General discussion

IACHEC Clusters with Resolve and Xtend (I. Aihara)

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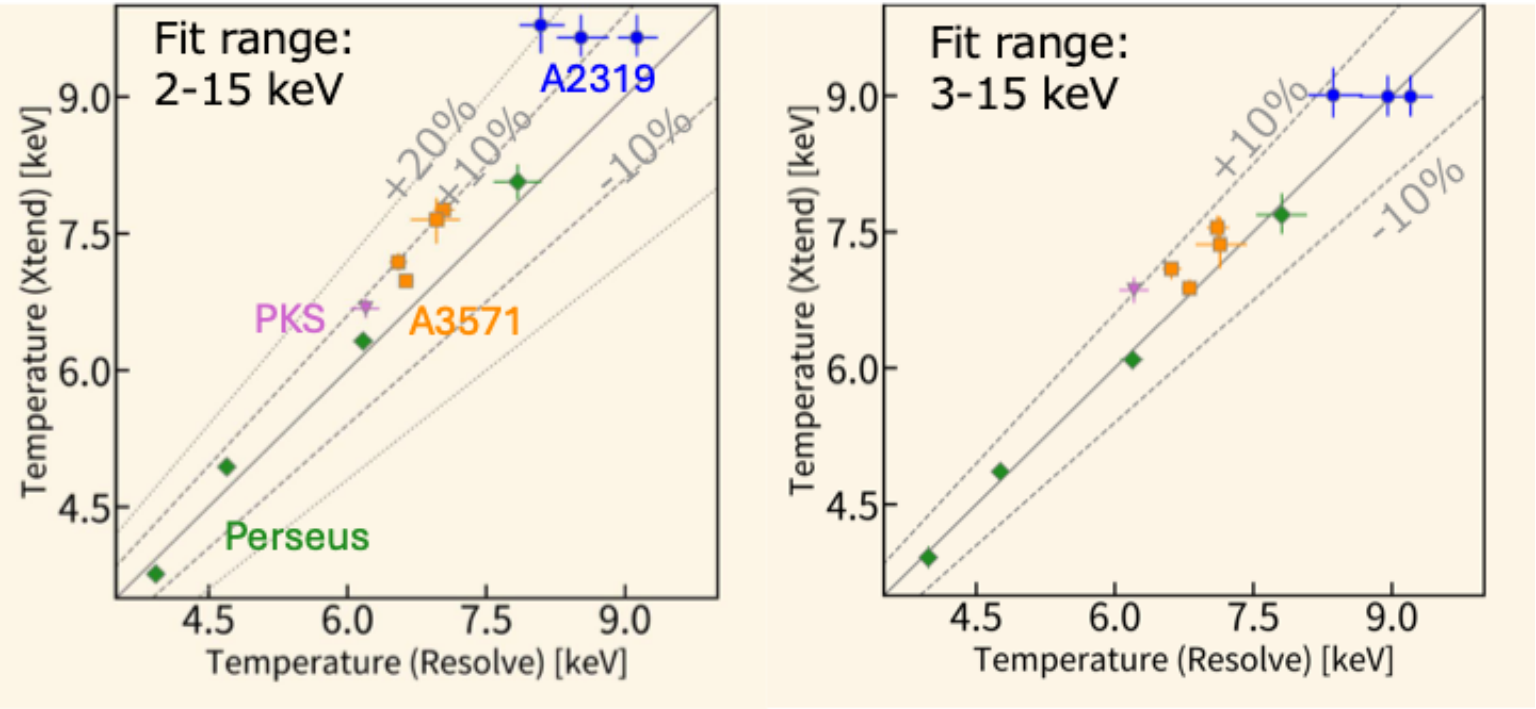
Resolve vs Xtend (kT)



- Using the 3–15 keV band reduces temperature discrepancies between Resolve and Xtend.
- The Resolve and Xtend temperatures are consistent within±10%.

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IACHEC Clusters with Resolve and Xtend (K. Suda)

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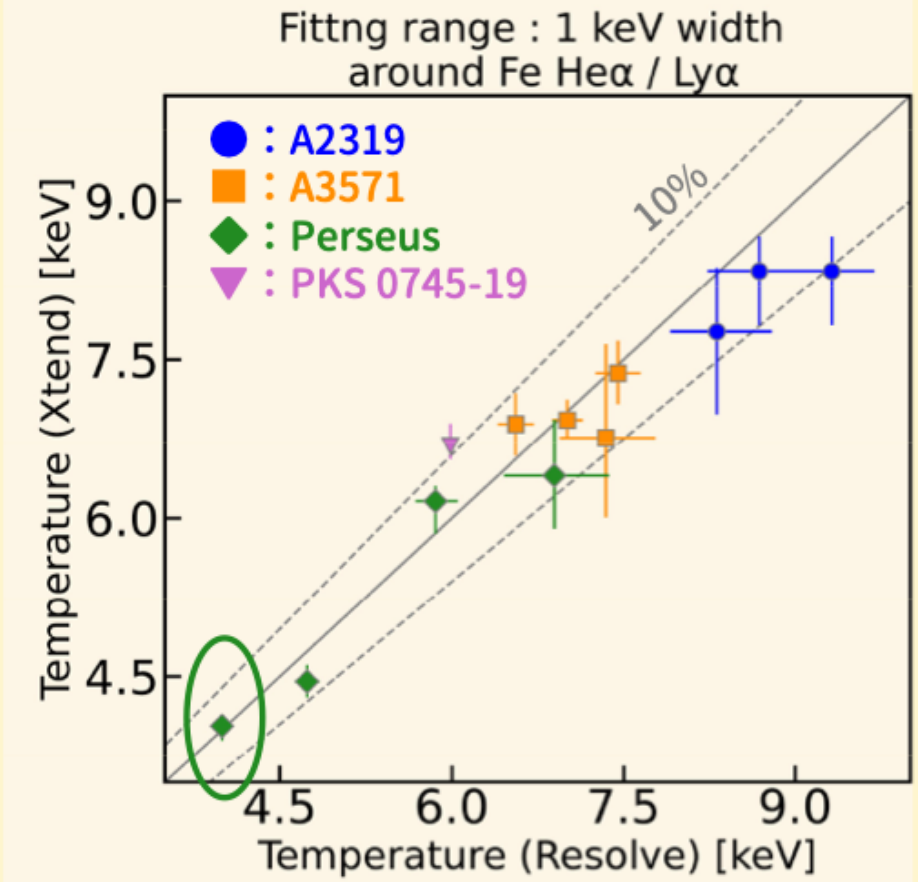
Narrow-band Temperature (Resolve vs Xtend)



- Consistent between Resolve and Xtend within 10%.
- Good consistency in Perseus center observation.

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Cluster Multi-Mission Study (D. Wik)

- **A correction to *Chandra*'s hard band effective area similar to *XMM-Newton*'s achieves better agreement with *NuSTAR*, although it's not perfect**
- **The *XMM-Newton* effective area correction tends to exacerbate disagreement with *NuSTAR*; temperatures pushed even lower**
- **Need to do spatially resolved comparisons across the archives, find patterns to track down potential origins of discrepancies**

Cluster	t_{Nu} (ks)	t_{Ch} (ks)	t_{XMM} (ks)	Cluster	t_{Nu} (ks)	t_{Ch} (ks)	t_{XMM} (ks)
Bullet	294	584	47	Abell 754	124	190	312
ZWCL 1856d8	268	43	13	Abell 2255	123	45	42
A2146	265	2386	-	Abell S753	121	87	133
SPT CLJ2031m4037	238	259	30	Abell 2163	117	90	153
Ophiuchus	232	283	230	Abell 2029	102	184	198
Abell 478	222	153	130	Coma	60	486	281
Abell 523	209	30	230	ZWCL 1856d8p6616	29	43	12
Abell 3266	208	35	187	RXC J1504	24	164	300
Abell 665	198	161	266	Abell 3112	22	152	228
CL 0217p70	177	25	-	Abell 3158	22	62	32
RX J1347d5m1145	172	331	38	Abell 1644S	21	71	34
Abell 2256	166	218	296	Abell 3558	21	15	68
MACS J0717d5p3745	163	247	195	Abell 496	20	105	291
CIZA 0107d7p5408	159	165	-	Abell 3391	20	68	69
Abell 1795	154	3552	137	Abell 1651	20	10	27
Abell 2199	138	160	180	Abell 3571	18	34	34
Abell 2319	134	91	92	Abell 1650	18	252	43
Abell 3395	129	120	30				

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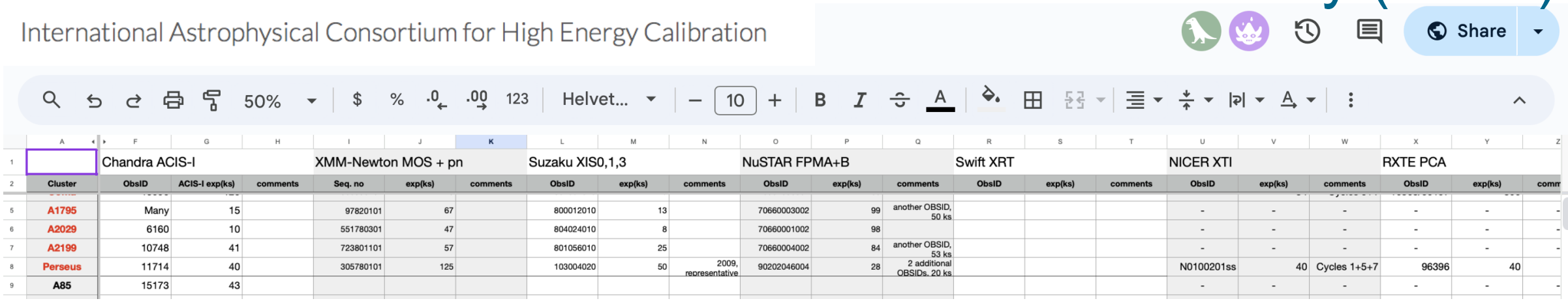
Multi-Mission Study (MMS)



	Cluster	Chandra ACIS-I			XMM-Newton MOS + pn			Suzaku XIS0,1,3			NuSTAR FPMA+B			Swift XRT			NICER XTI			RXTE PCA		
		ObsID	ACIS-I exp(ks)	comments	Seq. no	exp(ks)	comments	ObsID	exp(ks)	comments	ObsID	exp(ks)	comments	ObsID	exp(ks)	comments	ObsID	exp(ks)	comments	ObsID	exp(ks)	comm
5	A1795	Many	15		97820101	67		800012010	13		70660003002	99	another OBSID, 50 ks				-	-	-	-	-	-
6	A2029	6160	10		551780301	47		804024010	8		70660001002	98					-	-	-	-	-	-
7	A2199	10748	41		723801101	57		801056010	25		70660004002	84	another OBSID, 53 ks				-	-	-	-	-	-
8	Perseus	11714	40		305780101	125		103004020	50	2009, representative	90202046004	28	2 additional OBSIDs. 20 ks				N0100201ss	40	Cycles 1+5+7	96396	40	
9	A85	15173	43														-	-	-	-	-	-

Mission	Contact
XMM-Newton	Ivan Valtchanov
Chandra ACIS	Larry David
Suzaku XIS	Eric Miller
NuSTAR	Dan Wik
Swift	Andy Beardmore
AstroSat	Gulab Dewangan
HXMT	Yong Chen
EP FXT	Yong Chen
NICER	Craig Markwardt
eROSITA	Michael Freyberg
XRISM Xtend	[Eric Miller]
ROSAT	?

- Future plans
  - Collect data, extract spectra and responses.
  - Focus on providing data for Calstats WG concordance effort.