

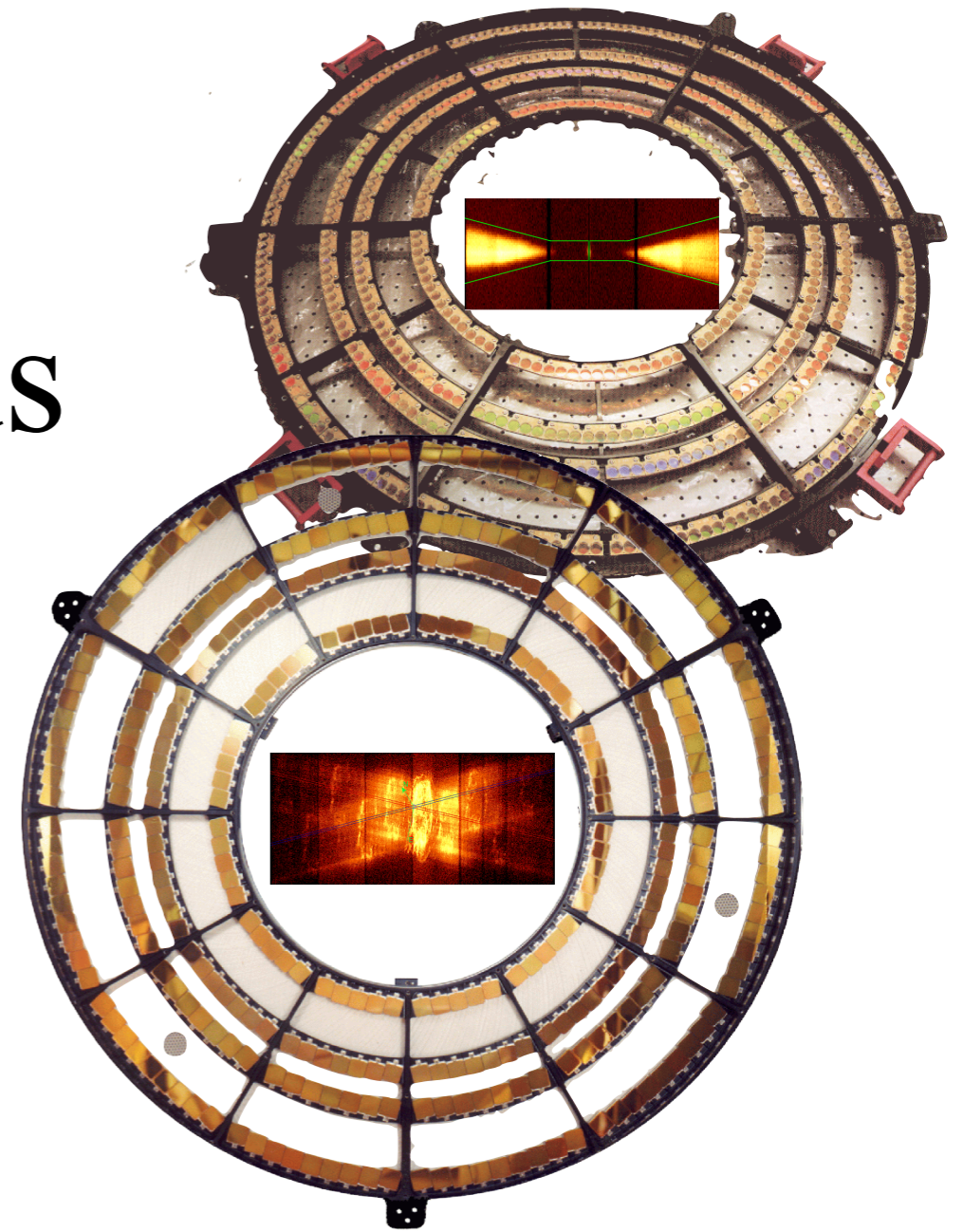


MIT KAVLI INSTITUTE

HETG/LETG — Status

Chandra Quarterly Review No. 46
10 October 2018

David Huenemoerder
dph@space.mit.edu



HETG IPI: Prof. C.R. Canizares
MIT Kavli Institute

Ongoing HETG Team Activities Summary



HETG/ACIS-S Performance (April — September 2018); 1470 ks

- 45 HETG observations on 13 targets (29 GO, 11 GTO, 3 Cal, 1 TOO, 1 DDT)

LETG Performance (April — September 2018); 498 ks

- 10 LETG/HRC-S observations, 5 targets (4 GTO, 4 Cal, 2 DDT, 280 ks)
- 1 LETG/HRC-I observations (Cal, 2 ks)
- 7 LETG/ACIS-S observations, 2 target (Cal, 215 ks)

Grating performance is nominal.

TGCat has 1893 extractions for 483 objects (+60/+7 since last report)

Total volume: 425 GB

Downloads: 118 packages, 28 GB

11288 single file, 1.9 GB

<http://tgcat.mit.edu>

Cycle 18:

- ★ ULX/BH: NGC 1313 X-1 481 ks Ultra-luminous source outflow: absorption, emission lines
- ★ NS/BH: GRS 1915+105 97 ks Black hole accretion, line variability
- ★ XRB: 4U 1626-67 45 ks Neutron star accretion; Fe K absorption variability

Cycle 19:

- ★ **AGN:** **Fairall 51** 120/240 ks Seyfert 1, warm absorber variability (w/ NuSTAR 120 ks)
- ★ **HMXB:** **4U 1907+09** 142 ks Accreting neutron star; wind emission, absorption lines
- ★ Stars: V773 Tau 0/140 ks Evolution of pre-MS stars; flares (w/ NuSTAR 150 ks)
- ★ Stars: TW Hya 0/55 ks Accretion/winds in pre-main-sequence stars (*HETG/HRC-I*)
- ★ ISM: 4U 1636-53 128 ks Si, Fe absorption edges; part of survey vs N_H

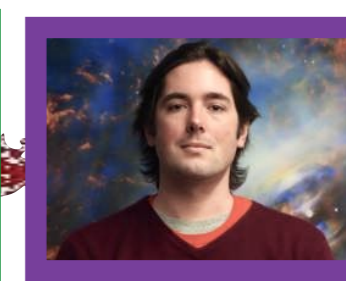
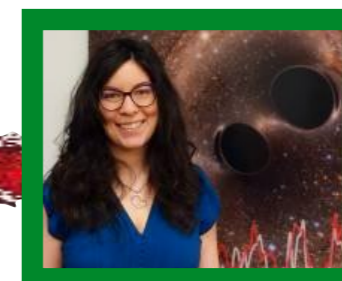
Cycle 20:

- ★ NS: Terzan 5 X-2 0/200 ks TOO (10%); Neutron Star Equation of State
- ★ LIGO: GW2019nnnn 0/300 ks TOO (10%); Gravitational wave transient
- ★ Stars: SZ 96 0/250 ks Young, low mass stellar accretion
- ★ Stars: TW Hya 0/20 ks HETG/HRC-I accretion in young stars (w/ HST)
- ★ **XRB:** **4U 1626-67** 0/50 ks Neutron star accretion (monitoring)
- ★ SNR: Cas A 0/100 ks Decadal visit — 20 yrs on, dynamics
- ★ **AGN:** **Mrk 355** 0/280 ks TOO Narrow Lined Seyfert, w/ NuSTAR, NICER; warm absorbers

HETG Postdoc status/activities:

Dr. Rozenn Boissay, since Feb 2017 (Ph.D. U. Geneva, May 2016)

Dr. Paul Hemphill, since Oct 2016 (Ph.D. UCSD, August 2016) [partial GTO support]



LETG/GTO Science Program



Cycle 18:

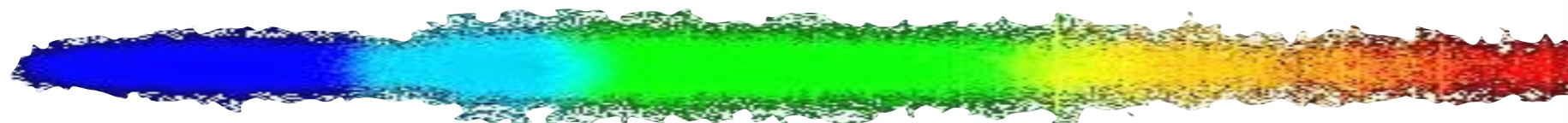
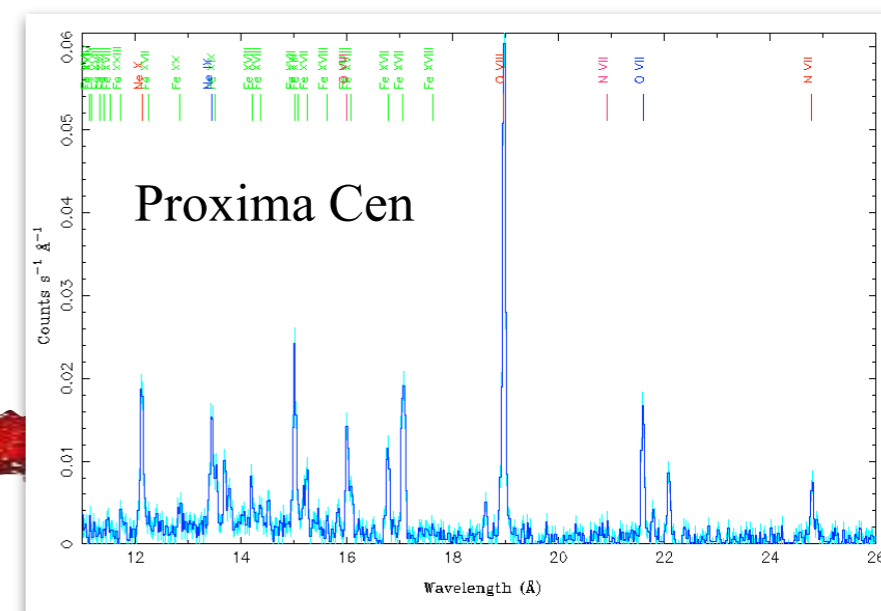
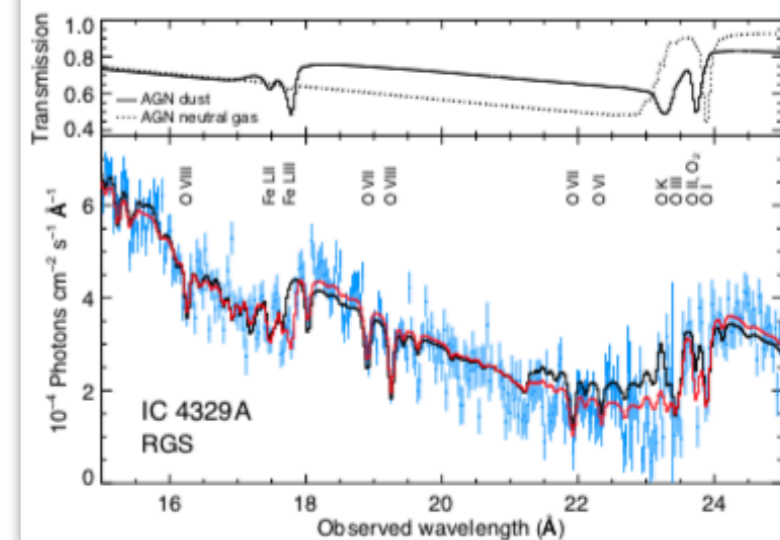
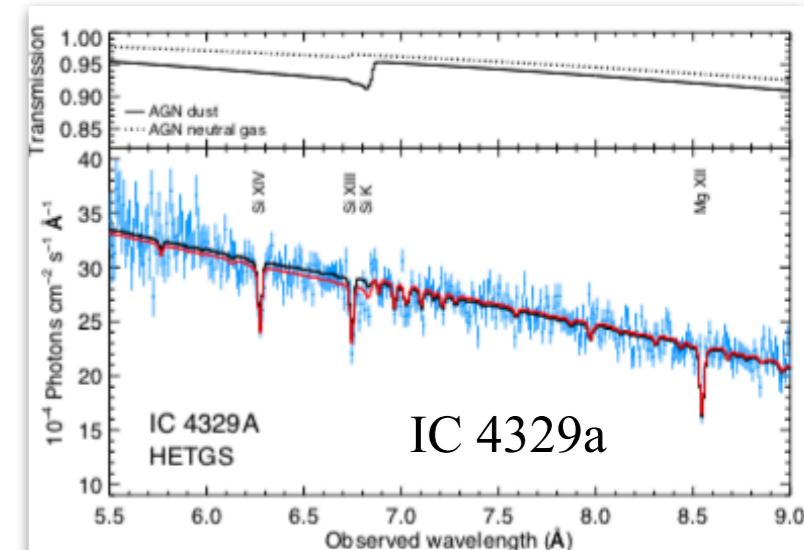
- ★ AGN: (Kaastra/SRON) IC 4329a 174 ks Neutral, warm absorbers (HETG/ACIS-S) Mehdipour, Costantini et al. 2018, A&A in press; <<https://arxiv.org/abs/1808.04628>>
- ★ Stars: (Predehl/MPE) Proxima Cen 166 ks Reference spectrum of an old M-dwarf (LETG/HRC-S)

Cycle 19:

- ★ NS: (Predehl/MPE) RX J2143.0+0654 173 ks Cyclotron Absorption Line in an Isolated Neutron Star (LETG/HRC-S)
- ★ Gal: (Kaastra/SRON) 1E 2216/1E 2215 147 ks Shocks in Galaxy Cluster Collisions (ACIS-I)
- ★ ISM: (Kaastra/SRON) 4U 1608-522 25 ks ISM dust, Mg and Si K-edge absorption (HETG/ACIS-S)

Cycle 20:

- ★ NS: (Predehl/MPE) RX J1856.6-3754 0/172 ks Isolated neutron star, calibration (with eRosita) (LETG/HRC-S)
- ★ Gal: (Kaastra/SRON) NGC 5548 0/175 ks AGN outflows, absorption, ionization, obscuration (HETG/ACIS-S)



HETG Science: Active Galactic Nuclei

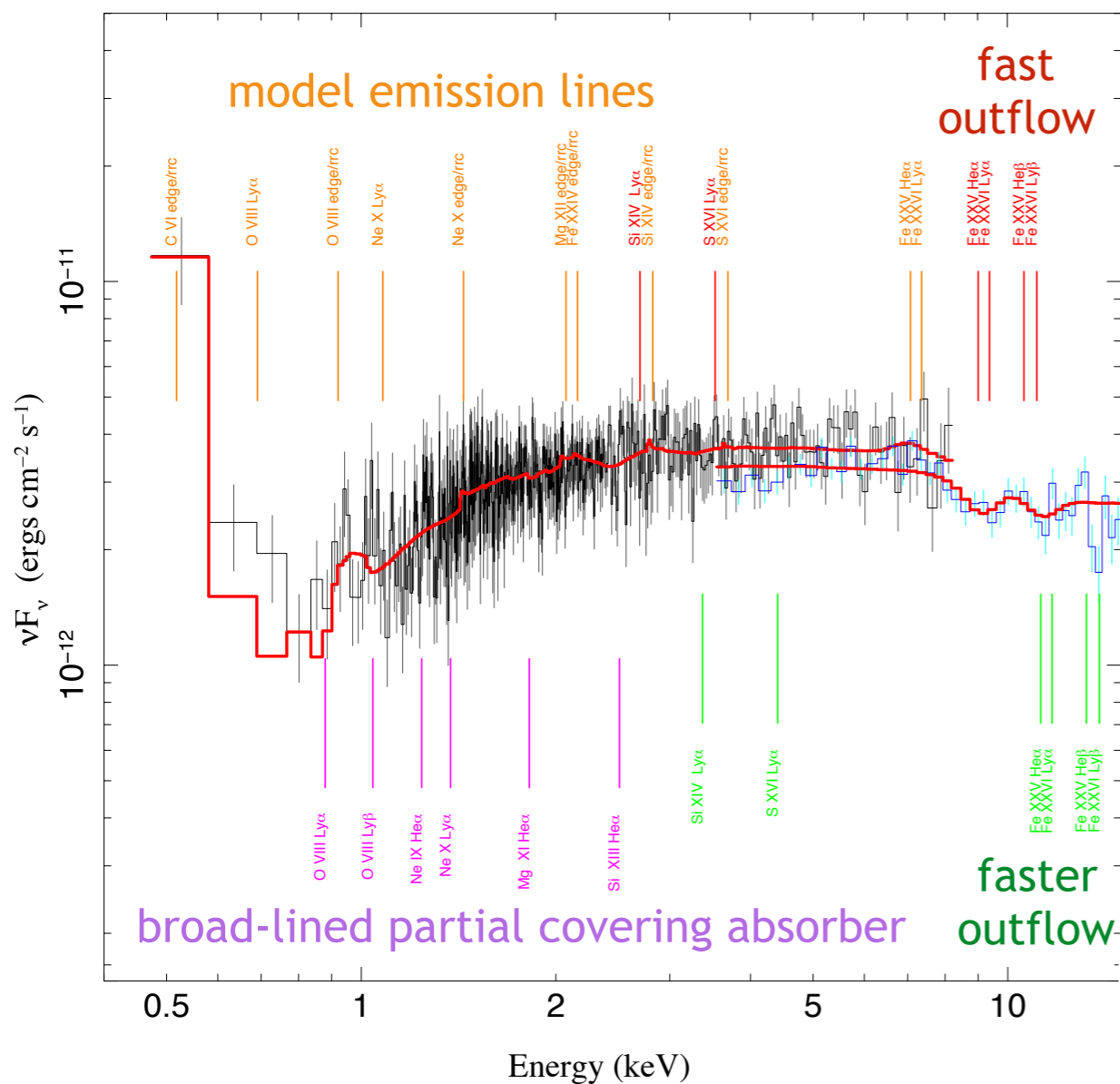


Relativistic components of the Ultra-Fast Outflow in the Quasar PDS 456 from Chandra/HETGS, NuSTAR and XMM-Newton observations

Rozenn Boissay-Malaquin,

Ashkbiz Danehkar, Herman Marshall, Michael Nowak

(Submitted to ApJ)



- ▶ Chandra/HETGS (136 ks) + NuSTAR (74+38 ks) 2015 (left)
- ▶ Chandra/HETGS 2003 (142 ks), XMM+NuSTAR 2013-2014)
- ▶ 2 UFOs detected: $v_{\text{out1}} = -0.26c$ (red), $v_{\text{out2}} = -0.48c$ (green), and partial covering absorber (pink)
- ▶ Blue-shifted absorption features from He- and H-like ions of Fe and Ni around 9 and 11 keV, and of O, Ne, S and Si at lower energy
- ▶ Several methods used to characterize the absorbers: set of Gaussian lines, P Cygni profiles, blind line search, photoionization modeling...
- ▶ *Kinetic power of 0.8-8% of bolometric luminosity => can play a significant role in the evolution of the host galaxy and AGN feedback.*

(20,000 km/s turbulent broadening on all components)

