



MIT Kavli Institute  
for Astrophysics  
and Space Research

# HETG - Status

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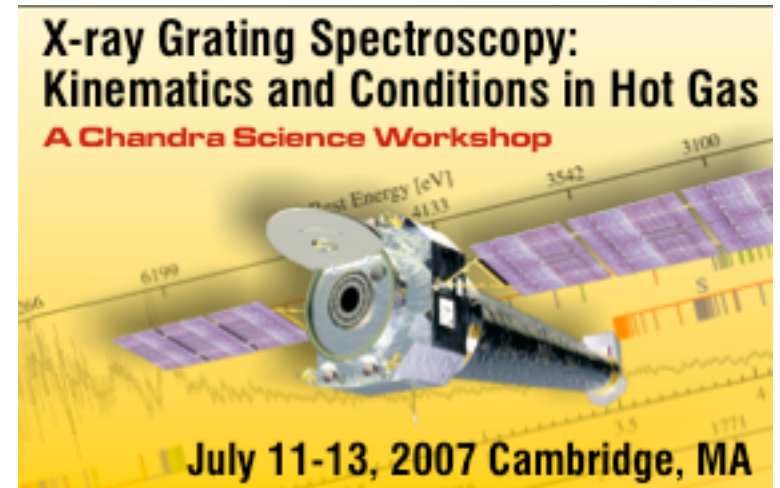
# Ongoing HETG Team Activities Summary

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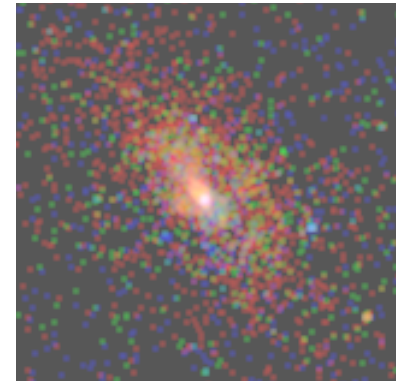
- HETG Performance ( Feb. 2007 - mid-May 2007)
  - 29 HETG obsids on 9 targets
    - ✓ Our GTO: **Crab(50ks), SN1987A(360ks)**
    - ✓ Deep exposures: TW Hydra and EX Hydra, 500ks each.
  - **Monitoring HRMA FWHM**: recent EX Hy observation added - OK.
  - HETG performance is nominal.
- HETG Calibration
  - Current/Future work:
    - More SNR E0102 for cross-calibration - assess new RGS model fluxes.
    - LETG-ACIS Capella observation (4/15/07) for precise LETG Rowland spacing.
    - HEG cross-dispersion asymmetry (initial work by Ishibashi)
    - Higher-orders' calibration



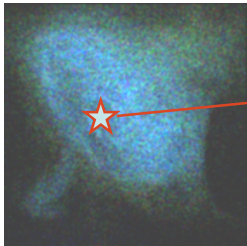
- Science Support to CXC, etc.
  - *Chandra* Newsletter article.
  - X-ray Grating Spectroscopy Workshop
    - Many talks/posters from MIT/HETG people.
- GTO Science Program
  - Cycle 8 program: 2 done, 2 to go.
    - **Crab** and **SNR 1987A** - see next pages.
  - GTO Target selection for Cycle 9 - No conflicts.
    - Orion cont.(150ks); X1822-371 (150ks); NGC 1068 (400ks)
  - Postdoc status:
    - 3 PDs with finishing dates: 9/08, 3/09, 8/09.
    - Current contract covers them.
    - Desire FY10+ info by Spring-Summer '08 .



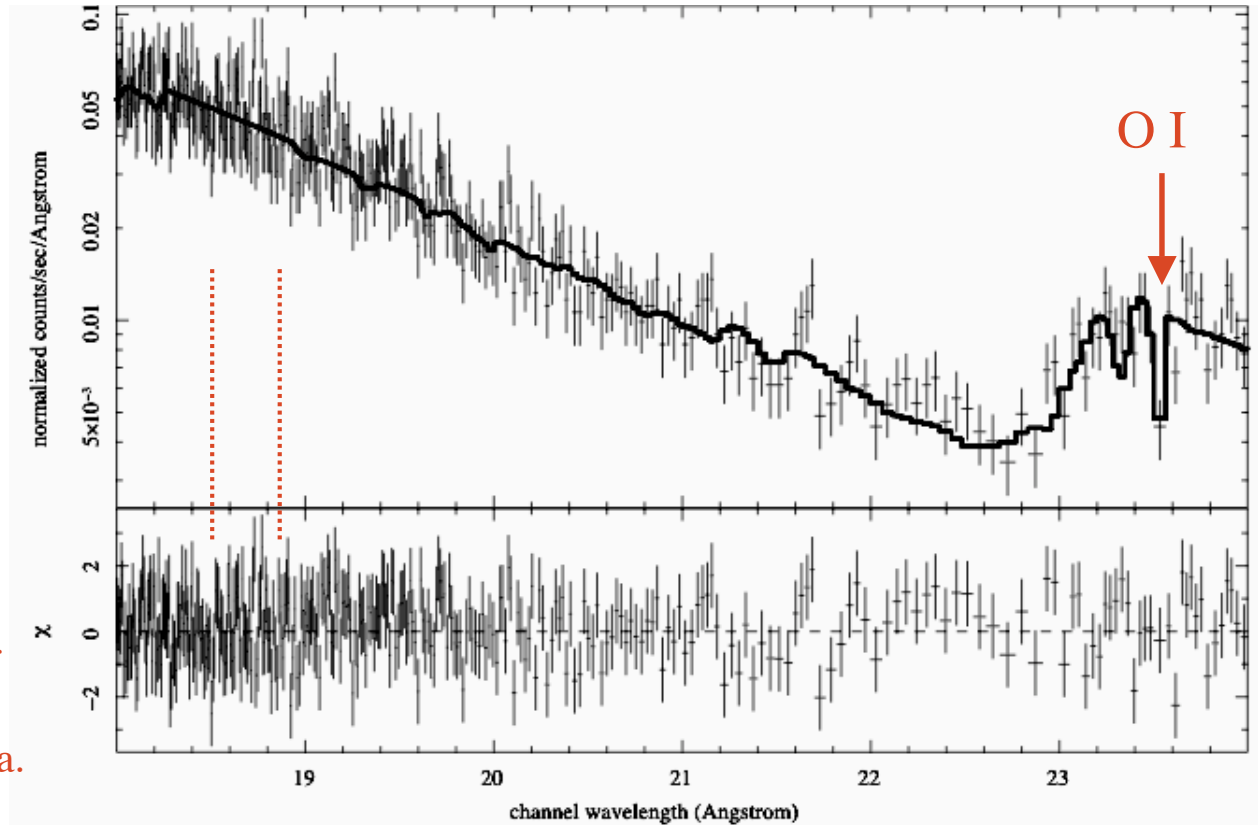
NGC 1068; 46ks in Cycle 1



# Crab Pulsar -- Searching for an expanding shell



X-rays from pulsar pass through surrounding plasma.



The HETG spectrum (right) with model curve (solid) shows structure expected from the instrument (e.g., the feature at 23.3Å) and a neutral oxygen (O I) feature of the ISM at 23.5 Å.

An imagined 1700 km/s expanding shell around the Crab would show absorption lines at 18.519 Å from O VII K-beta and at 18.857 Å from O VIII K-alpha (dotted lines.) These lines are not "jumping out" of this initial data analysis :-("Look and learn")

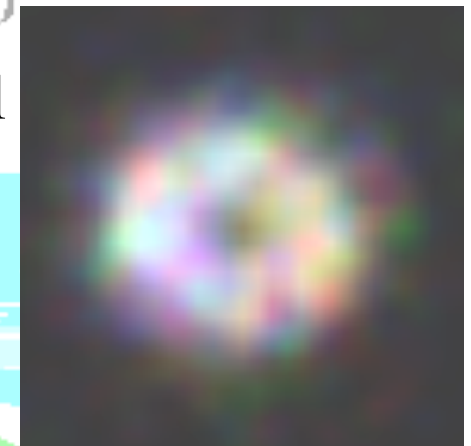
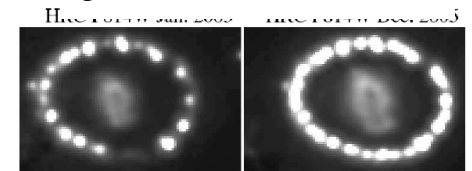
# SN 1987A -- A detailed portrait at 20 years

- 20 years since SN explosion on Feb. 23 1987.
- Two complementary grating data sets:
  - ✓ **Spring'07: 370 ks w/HETG (GTO)**
    - Fall'07: 300 ks w/LETG (McCray PI)
- 360.6 ks of data taken in from 11 March - 17 April
- Roll maintained in observation sets - great!
  - Roll 269.4820: 7 obsids for 160.7 ks
  - Roll 256.0784: 6 obsids for 163.8 ks
  - Roll 237.8017: 1 obsid for 36.1 ks
- Initial results Poster appearing at AAS in Honolulu at:

*Endpoints and Interactions:*

*A Workshop On the Future of Supernova Remnant Research*

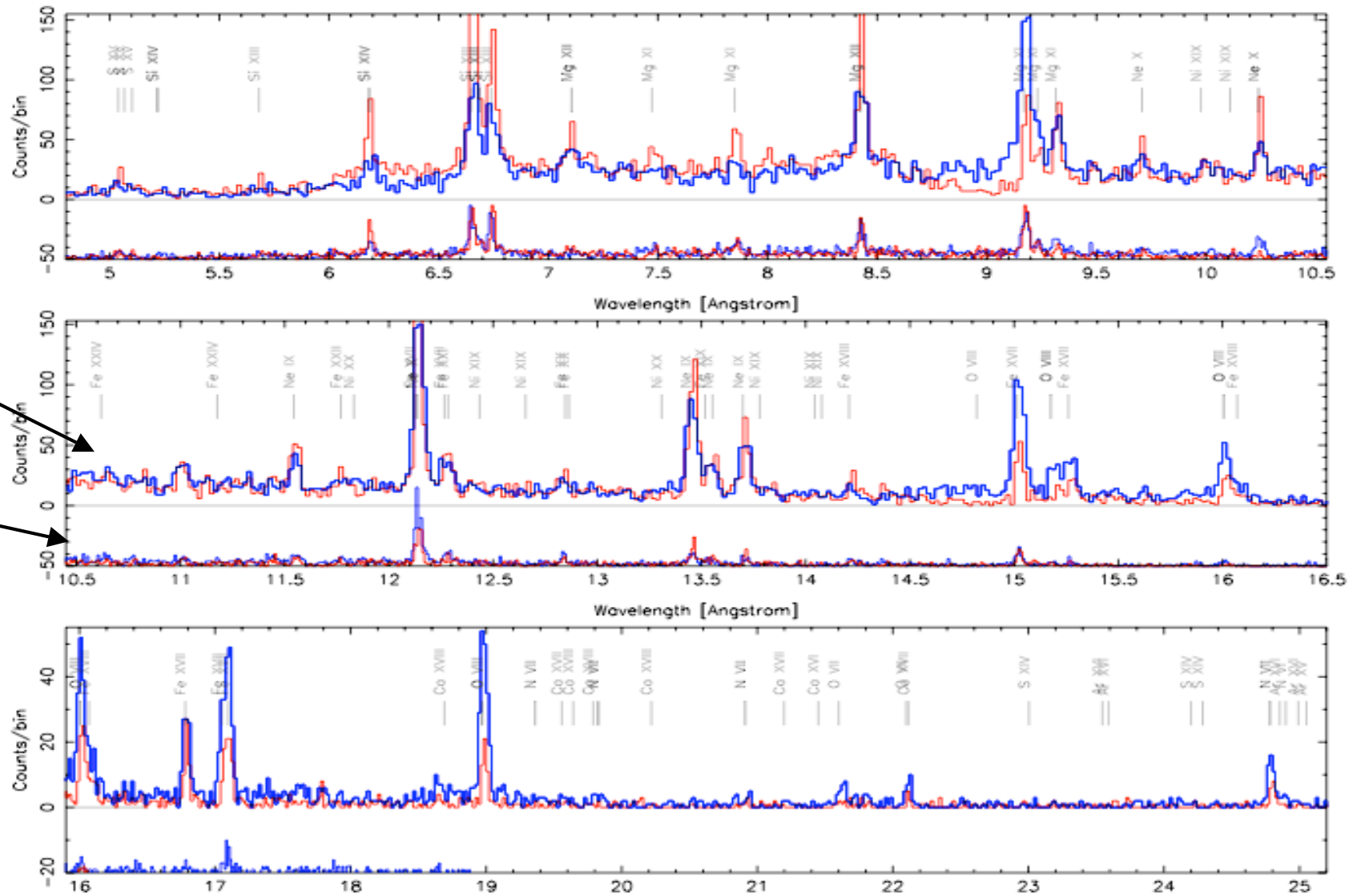
HST optical images  
Jan.'03      Dec.'05



~ 4 pixels !  
Zeroth-order  
combined  
image  
from 360 ks



# SN 1987A -- Very nice HETG spectra



MEG-plus  
MEG-minus

HEG-plus  
HEG-minus

# SN 1987A -- Spatial-Doppler effects in the data

The observed line shapes clearly show the Doppler signature of the moving, shocked ring material. In the plots below, emission from Ne X is well-fit with a ring velocity of 260 km/s. The fitting was carried out in [isis](#) using a custom 3d-geometric model.

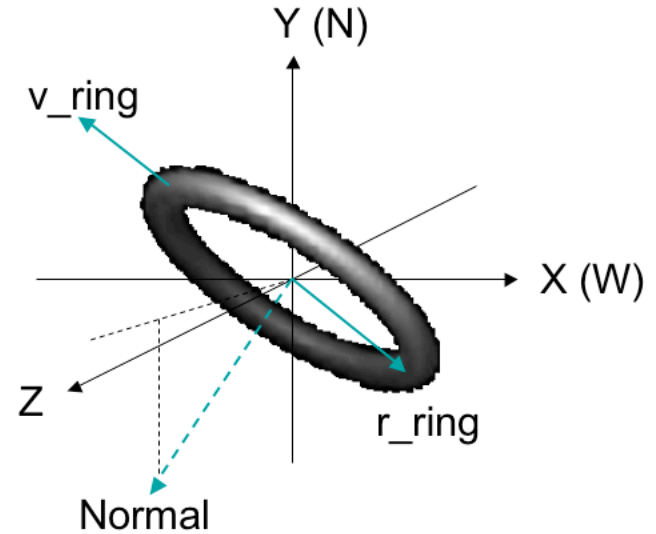
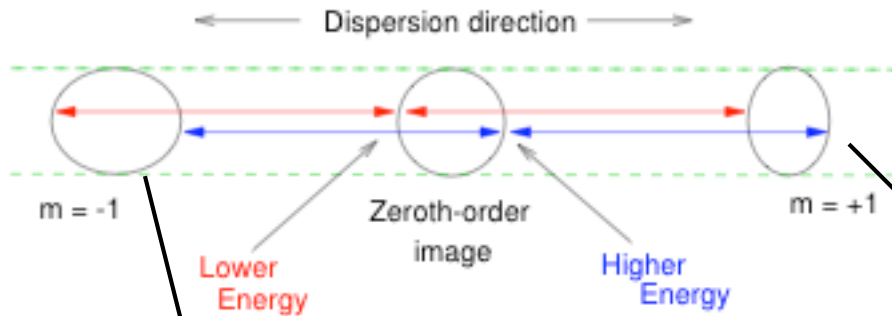


Figure 8.27 from the POG



**isis - 3D**

