Interstellar X-ray Absorption Spectroscopy of the Crab Pulsar with the LETGS

Frits Paerels (*Columbia Astrophysics Laboratory, Columbia University*), Martin C. Weisskopf, Allyn F. Tennant, Stephen L. O'Dell, Douglas A. Swartz (*Space Science Department, NASA Marshall Space Flight Center*), Steven M. Kahn, Ehud Behar (*Columbia Astrophysics Laboratory, Columbia University*), Werner Becker (*Max Planck Institut für Extraterrestrische Physik*)

[Contributed talk, 15min.]

Abstract

We study the interstellar X-ray absorption along the line of sight to the Crab Pulsar. The Crab was observed with the Low Energy Transmission Grating Spectrometer on the *Chandra X-ray Observatory*, and the pulsar, a point source, produces a full resolution spectrum. The continuum spectrum appears smooth, and we compare its parameters with other measurements of the pulsar spectrum.

The spectrum clearly shows absorption edges due to interstellar Ne, Fe, and O. The O edge shows spectral structure that is probably due to O bound in molecules or dust. We search for near-edge structure (EXAFS) in the O absorption spectrum. The Fe L absorption spectrum is largely due to a set of unresolved discrete $n = 2 - 3$ transitions in neutral or near-neutral Fe, and we analyze it using a new set of dedicated atomic structure calculations, which provide absolute cross sections.

In addition to being interesting in its own right, the ISM absorption needs to be understood in quantitative detail in order to derive spectroscopic constraints on possible soft thermal radiation from the pulsar.

CATEGORY: SUPERNOVAE, SUPERNOVA REMNANTS AND ISOLATED NEUTRON STARS