What can be Learned from X-ray Spectroscopy Concerning Hot Gas in the Local Bubble and Charge Exchange Processes?

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What Do We Want To Learn?

How much of the observed X-ray flux is absorbed after emissions originate from the solar plasma?

What is the physical state of the plasma in the Local Bubble (or shell) of our galaxy?

What are the abundances of the plasma?

What is the evolutionary history of the Local Bubble?

What is the structure of SWCX? Its emission properties, atmospheric and geophysical?

What is the zero level of SWCX emission?

Partial Answer

Nearly nothing or everything, it all depends on:

Spectral resolution - Can individual lines be resolved?
Instruments group - How many photons can be acquired in a reasonable exposure?
Instrumental energy bands - Is the sampled spectrum covering a useful energy range?
Signal-to-noise ratio - How much of the signal is in the way?
Field of view - How much of the sky can reasonably be observed in a useful mission?
Angular resolution - What angular radius can be resolved?
Distance to source - What is the viewing geometry of the local SWCX emission?

Ancient History

ROSAT

DXS - Diffuse X-ray Spectroscopy
Crystalline Spectrometer with 10.5m
Field of View: 30 degree
Angular Resolution: 10 arc sec
Sky Coverage: 48% of the sky
Laser beam at 0.1 keV

Modern History I

DXS - Diffuse X-ray Spectroscopy

Modern History 2

XMM-Newton

Spectral Resolution: CCDs with 100 arc sec
Field of View: 20 degree
Angular Resolution: 10 arc sec
Sky Coverage: Few percent of the sky
Laser beam at 2.5 keV
SUMMARY

High-resolution soft X-ray spectroscopy of diffuse emission can provide a routine tool for understanding the relative contributions of the Local Hot Bubble and SWCX.

- SWCX may provide a mechanism to remotely observe solar CMEs moving outward from the sun. Again, a high-resolution X-ray spectrometer could determine heat flux and abundance ratios.
- Add a second observatory and the CME could be triangulated providing detailed advance warning for impending storms.

References
