

# The XRISM mission and Lessons for Plasma Physics

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A goal of astrophysics is to learn about the origin and fate of distant objects by observing the radiation they emit and absorb. In order to do so, we must understand how the various observables depend on the interesting physical conditions in the astrophysical object. X-rays can be emitted or absorbed by gas and dust over a wide range of physical conditions, but it is common to observe X-rays associated with objects which are hot and their constituent gas is at least partially ionized. If so, the properties of the gas as a plasma must be understood in order to accurately interpret the astrophysical observations. This talk will review the use of plasmas as diagnostics of the conditions in distant sources and also the limits of such a procedure. This will include the customary assumptions used in interpreting astrophysical X-ray data, some of the scientific goals of X-ray astronomy, the status of current techniques for diagnosing astrophysical plasmas, and some examples of recent work toward improving our capabilities for modeling astrophysical plasmas. This will include both computational modeling and lab experiments. The XRISM mission is a joint US/Japan/Europe X-ray astronomy mission which includes a spectrometer with sensitivity and resolution which probes new parameter space in astrophysical plasmas. I will describe some recent results from this mission and the implications for our understanding of space plasmas.