

X-ray Spectroscopy of the Radiation-Driven Winds of Massive Stars: Line Ratio and Line Profile Diagnostics

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Abstract. Massive stars drive powerful, supersonic winds via the radiation pressure associated with the thermal UV emission from their photospheres. Shock phenomena are ubiquitous in these massive star winds, heating them to millions, and sometimes tens of millions, of degrees. The emission line spectra from this shock-heated plasma provide powerful diagnostics of the winds' physical conditions, which in turn provide constraints on models of wind shock heating. In this talk, I will discuss how photoexcitation out of metastable excited levels of helium-like ions can provide critical information about the location of the hot plasma in the massive star winds. I will also show how X-ray line transfer is affected by photoelectric absorption in the partially ionized component of the wind and how it can be modeled to determine the astrophysically important mass-loss rates of these stellar winds.