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High Energy (>10 MeV) Oxygen and Sulfur Ions Observed at Jupiter from Pulse Width Measurements of the JEDI Sensors

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The Jovian polar regions produce X-rays that are characteristic of very energetic oxygen and sulfur that become highly charged on precipitating into Jupiter's upper atmosphere. Juno has traversed the polar regions above where these energetic ions are expected to be precipitating revealing a complex composition and energy structure. Energetic ions are likely to drive the characteristic X-rays observed at Jupiter (Haggerty et al., 2017; Houston et al., 2018; Kharchenko et al., 2006). Motivated by the science of X-ray generation, we describe here Juno JEDI measurements of ions above 1 MeV, and demonstrate the capability of measuring oxygen and sulfur ions with energies up to 100 MeV. We detail the process of retrieving ion fluxes from pulse width data on instruments like JEDI (called "puck's"; Clark et al., 2016; Mauk et al., 2013) as well as details on retrieving very energetic particles (>20 MeV) above which the pulse width also saturates. The Juno JEDI instrument is shown to have the unplanned capability to measure heavy ions to energies as high as 100 MeV. As such, the JEDI instrument has the capability to measure those ions needed to generate polar X-rays at Jupiter. (> 10's of MeV O and/or S). We present analysis that involves separating these very energetic ions into the group that is trapped (i.e., part of the very high latitude radiation belts) and the group that is precipitating and might be linked to observed X-rays.