

RHESSI hard X-ray and gamma-ray imaging spectroscopy of solar flares

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The RHESSI (Ramaty High Energy Solar Spectroscopic Imager) mission that has provided for the first time, gamma-ray imaging, high resolution gamma-ray spectroscopy, hard X-ray imaging spectroscopy of solar flares. We review the major results from the first four years operation, including the imaging of five flares in the 2.223 MeV neutron-capture line produced by energetic ions, the detection of pre-impulsive phase acceleration of electrons high in the corona, the evidence from hard X-ray footpoint motions for energy release and particle acceleration from magnetic reconnection in the corona, the inversion of the hard X-ray spectrum to obtain the parent energetic electron energy spectrum, the detection of albedo emission, and the possible detection of hard X-ray polarization. In the context of these pioneering observations, we discuss the requirements for the next generation hard X-ray/gamma-ray imaging and spectroscopy instrumentation.