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Pulsations and oscillatory signatures in solar flares – a unique probe of fundamental flare processes

LAURA HAYES, NASA Goddard

Solar flares are the most powerful and energetic physical phenomena in our solar system, releasing radiation across the entire electromagnetic spectrum with total energies reaching on the order of 10^{25} J in a matter of minutes. A key observational feature of the emission generated in solar flares is the presence of pronounced pulsations and oscillatory signatures known as quasi-periodic pulsations. Despite decades of research into the phenomena, the true nature and underpinning mechanisms causing the oscillatory signatures remains poorly understood. The occurrence of such pulsations in flaring emission places additional constraints on the interpretation and processes that operate in solar flares, and hence a full description of the phenomena is required to build towards an integrated solar flare model. In this talk I will present an overview of quasi-periodic pulsations that exists in solar flare emission and discuss a recent statistical study of quasi-periodic pulsations observed in the X-ray emission from flares over the last solar cycle, placing the results in the context of proposed mechanisms.