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X-ray jitter radiation in Cassiopeia A

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X-ray emission from young supernova remnants (SNRs) is characterized by non-thermal radiation and is usually interpreted as synchrotron process. This type of emission is detected in regions close to the shock front and it is explained with the the diffusive shock acceleration (DSA) theory, which requires high magnetic turbulence. However, the current spectral models used to fit the data overlook the influence of the turbulence in the shape of the emitted photons' spectrum. A more appropriate emission process, self-consitently including such turbulence effects, is known as jitter radiation. So far, jitter radiation has never been considered as a putative responsible of the non-thermal emission observed in SNRs. In this talk I present preliminary results on multi-instrument X-ray data analysis of the SNR Cassiopeia A (Cas A) adopting non-thermal models having different spectral shapes, including a custom jitter model. The spatially resolved spectral analysis showed that jitter radiation is most likely at work in most of the SNR. The successful detection of jitter radiation gives us new direct diagnostic tools of the physical scale size and of the spectral distribution of the magnetic turbulence across various region of the SNR.

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