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Detailed look at the temporal correlation between hard X-ray flare and type III radio bursts

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It is well known that flare-accelerated electrons can produce both hard X-ray (HXR) emission and Type-III radio bursts. The HXR emission is produced by the accelerated electrons propagating towards the chromosphere where they deposit their energy while Type-III radio bursts are produced by the accelerated electron beams traveling towards the outer solar atmosphere. Hence a temporal correlation between these two kinds of emission may imply a common origin of the accelerated electrons providing insight into the acceleration process, and allows us to connect electrons at the Sun to those in the heliosphere. On 2022-Nov-11 11:30 - 12:00 UT, the Spectrometer Telescope for Imaging X-rays (STIX) on Solar Orbiter observed a highly energetic flare event with an excellent time resolution of 0.5 s. Simultaneously there were observations of multiple coronal and interplanetary Type-III radio bursts from several instruments such as I-LOFAR, WIND/WAVES, NDA and ORFEES. I-LOFAR provides high-sensitivity imaging spectroscopy in the range of ~10-240 MHz with a time resolution of 1.31 ms and a frequency resolution of 195 kHz. We examine the temporal correlation between the X-ray and radio time series and discuss the relationship between the two and what it implies about the origin of the electron populations producing these two kinds of radiation.