Example of a FASR SUC: High Time Resolution Study
"FASR Science Use Case Submission Form" Format

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Science Use Case Title: Study of Electron Acceleration with High Time Resolution

Science Goal:
The goal of this science case is to investigate electron acceleration timescales in solar flares by taking fast (tens of ms) cadence FASR measurements of gyrosynchrotrom emission. Flare accelerated electrons are known to emit hard X-ray bursts on the order of tens to hundreds of ms (e.g. Knuth & Glesener, ApJ, 2020). This set of FASR measurements will determine whether high energy electrons also exhibit such fast time scales and where these electrons are located.

Science Working Group(s) of Interest:
SWG1 – Magnetic Reconnection & Particle Acceleration

Scientific Rationale: Importance
The timescales of solar flare particle emission can be used to constrain acceleration mechanisms, so this is vital in determining how flares accelerate electrons.

Scientific Rationale: Uniqueness to FASR Capabilities
Hard X-ray facilities can also investigate this, but unless they are direct imaging, they are most likely to see emission from the footpoints and not from the acceleration sites. Hard X-ray and FASR measurements would be highly complementary for this science case.

Scientific Rationale: Synergies
Hard X-ray measurements would be highly complementary for this science case, and also any observatories that study solar flares (accelerated electrons or atmospheric response) with a high time cadence.

Observational Targets: Target Type:
Solar Flares

Observational Targets: Event-Driven or Long-Term Monitoring?
Event-driven

Observational Targets: Description
Gyrosynchrotron emission from solar flare electrons near the acceleration sites.

Observational Targets: Number of Targets:
1

Observational Targets: Spatial Scale of Each Target:
A few arcminutes

Observational Targets: Spatial Distribution of All Targets
I would want to track one active region with a high flaring likelihood for the entirety of the observation.

Observational Targets: Shortest Temporal Scale of Interest:
Milliseconds

Observational Targets: Frequency Range:
Nominal Range

Polarization Product Required
Not sure