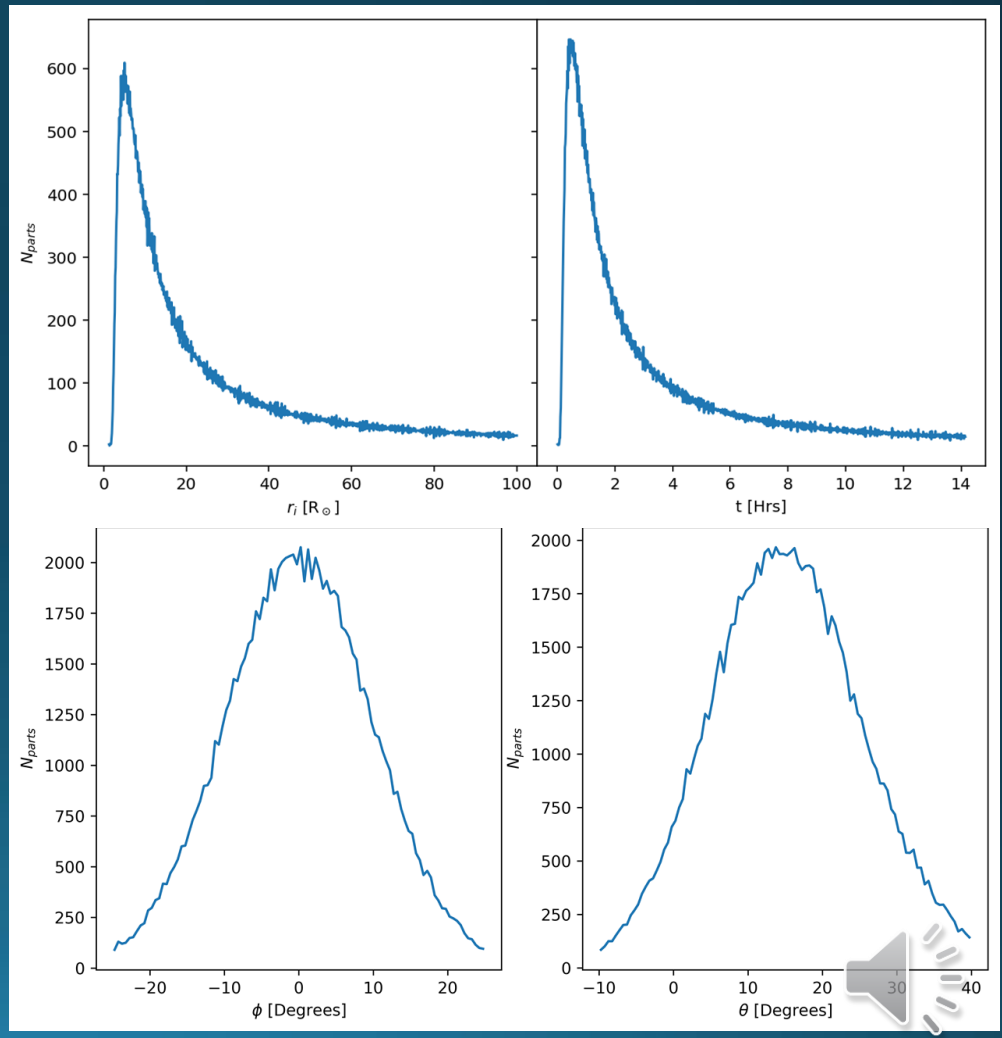
Test-Particle Simulations of SEPs Originating from an Expanding Shock-like Source

A. Hutchinson [1]; S. Dalla [1]; T. Laitinen [1]; C. O. G. Waterfall [1]

[1] Jeremiah Horrocks Institute, University of Central Lancashire, Preston, PR1 2HE, UK

The Injected Proton Population

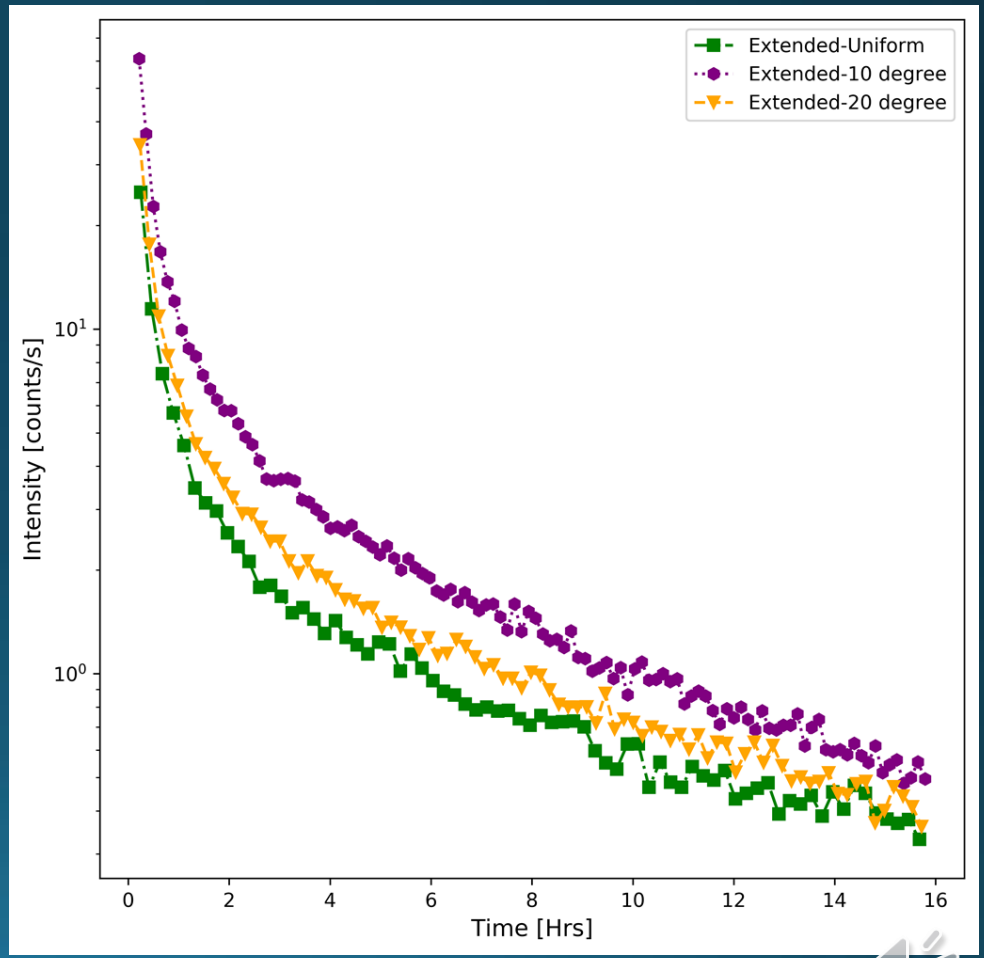
- Previously instantaneous injection at fixed radial distance
- Radially and temporally extended injection
- Use a spherical segment spanning 50°in longitude and latitude
- Inclusion of longitudinal and latitudinal variation in particle acceleration efficiency
  - Gaussian distributions in longitude and sine latitude



Uniform vs Gaussian Angular Distributions

A more shock-nose skewed injection results in:

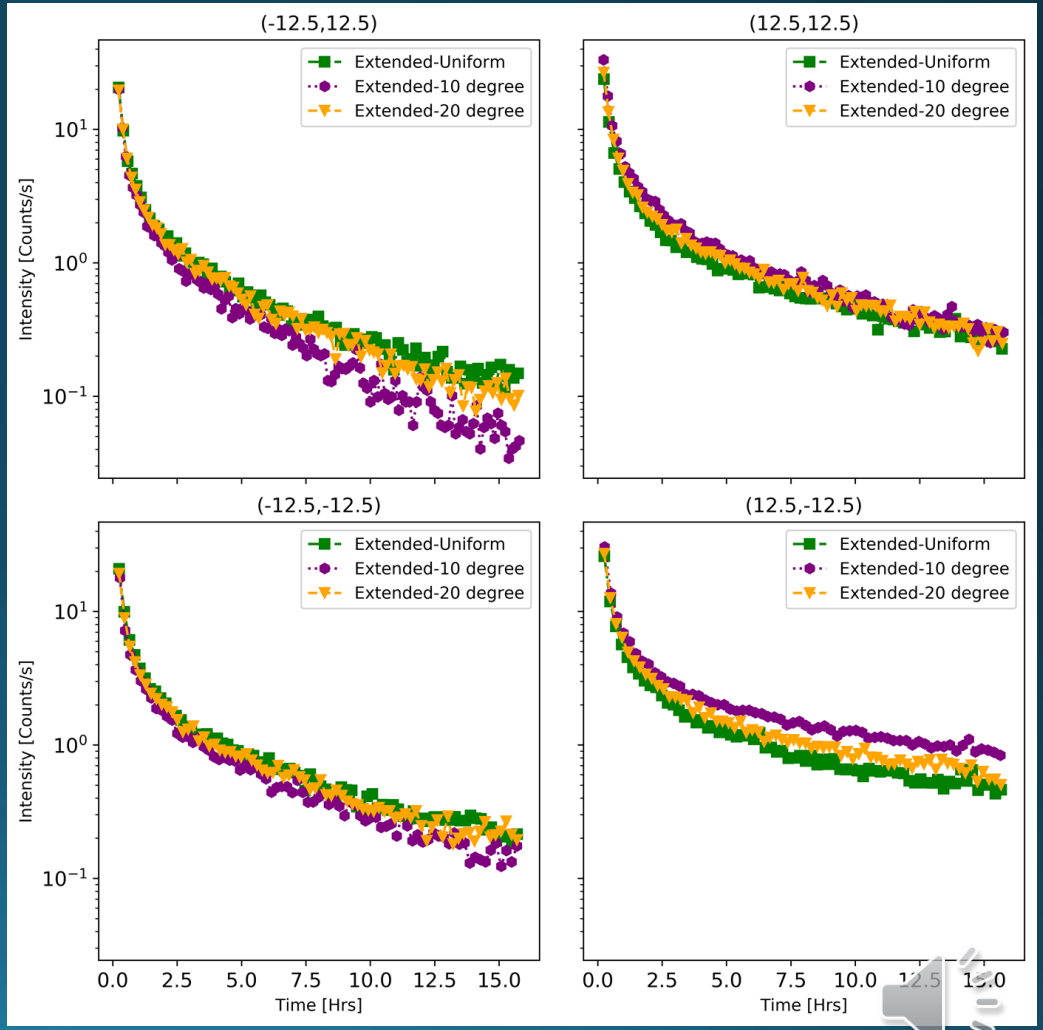
- Larger intensities and slower decays measured at the initial magnetically well-connected region at 1 au



Uniform vs Gaussian Angular Distributions

A more shock-nose skewed injection results in:

- Faster decays eastwards of the initial well-connected position
  - Radial motion of the particle-injecting shock.



Other Results

- Instantaneous vs extended particle injection

  Extended injection leads to:
  - Slower decay phases in intensity profiles at 1 au
  - Slightly lower peak anisotropies at 1 au

- Intensity profiles at 0.3 au
  - Little dependence on how the particle acceleration efficiency changes in longitude and latitude across the shock front.