Senior Review 2025
Call for White Papers

Stephen Fuselier

Kevin Genestreti

Senior Review Schedule and Call for White Papers

Senior Review	4/1/2024	8/1/2026
Release Draft CFP	1/1/2025	1/15/2025
Release Final CFP	2/1/2025	2/1/2025
Proposals Due	7/15/2025	7/15/2025
Final Report	12/31/2025	12/31/2025
Budget Memos Released	8/1/2026	8/1/2026

- Need an Early Start on Organizing the MMS Science
  - White papers should be delivered to Stephen/Kevin by 28 February 2025
- Start Thinking Now About Ideas for White Papers

New Science "White Paper": Format and New Features

- Similar in format to the last senior review proposal
- Will be Solicited by the Leadership Team
- ~1 Page and 1 Figure
  - 25% What we know
  - 25% What's the problem (or problems)
  - 50% How does the extended MMS mission (and, if applicable, the HSO) uniquely contribute to answering the science question
    - This is the methodology and closure
- **NEW**: Two broad science categories are available
  - Systems Science with MMS and the HSO
  - Fundamental Science (e.g., micro-physics of reconnection, shocks, turbulence, etc.)
- Also propose new spacecraft configurations

Please do not mix these elements

Would like to have an equal number of white papers for these two categories

What are We Looking For?

- Strong Emphasis on System Science
  - In line with the previous Senior Review emphasis on the HSO
- New Directions Based on Results from the Previous Senior Review Interval - For Example:
  - Declining Phase of the Solar Cycle, more CMEs, Recent Mother's Day storm demonstrates potential for more science
    - Potential to change ROI start/stop times for a multi-day storm
  - Filling in parameter space – more magnetotail events, Northern Hemisphere magnetopause crossings
  - Unbiased Magnetosheath Turbulence Campaign – science unique to MMS
  - Upcoming Conjunctions, demonstrate their value using conjunctions in the previous Senior Review interval

Backup

Cross-scale Kelvin-Helmholtz Science: An Example White Paper (1/4)

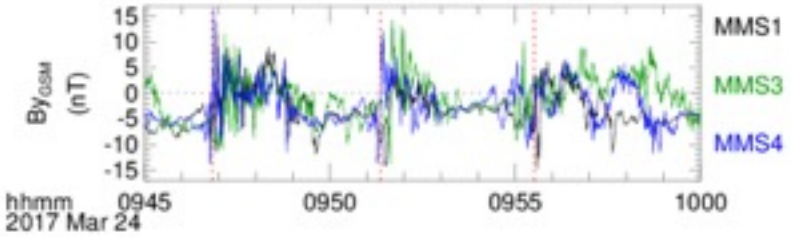
- What we know:
  - Multi-spacecraft Cluster observations demonstrate non-linear growth into rolled-up KHI vorticies
  - MMS observations demonstrate magnetic reconnection and turbulence in compressed KH sheets

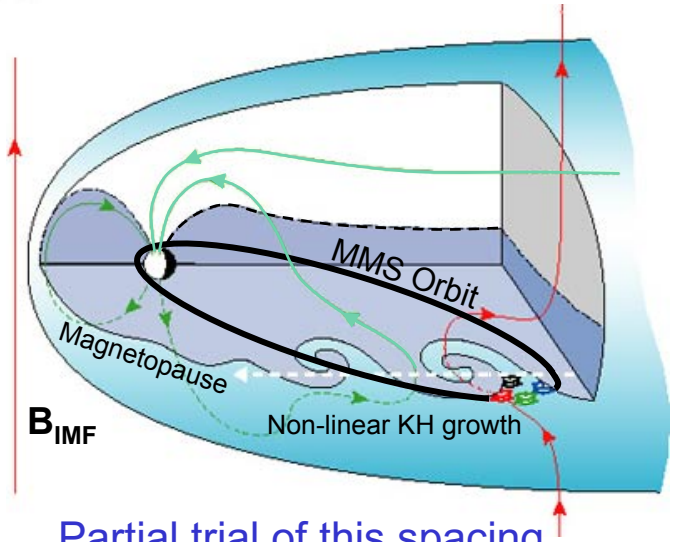
Cross-scale Kelvin-Helmholtz Science: An Example White Paper (2/4)

- What's the Problem?
  - 3 features of cross-scale coupling are not understood
    - Cross-scale physics of KH-associated current sheet evolution
    - Onset of KH turbulence at the magnetopause
    - Global dawn-dusk differences

Cross-scale Kelvin-Helmholtz Science: An Example White Paper (3/4)

- How does the extended MMS mission uniquely contribute?
  - New string-of-pearls configuration
    - 15000-650-30 km
  - MP skimming orbits on dawn-dusk sides
  - Largest scale (~100 di):
    - MHD scales and evolution of vortex-compressed magnetopause current sheets at 2 points – ion exhaust lifetimes
  - Intermediate scale (~10 di):
    - MMS straddles single X-lines – ion diffusion regions of opposite exhausts
  - Smallest scale (~15 de):
    - Sub-ion scale secondary KHI along parent vortex edges

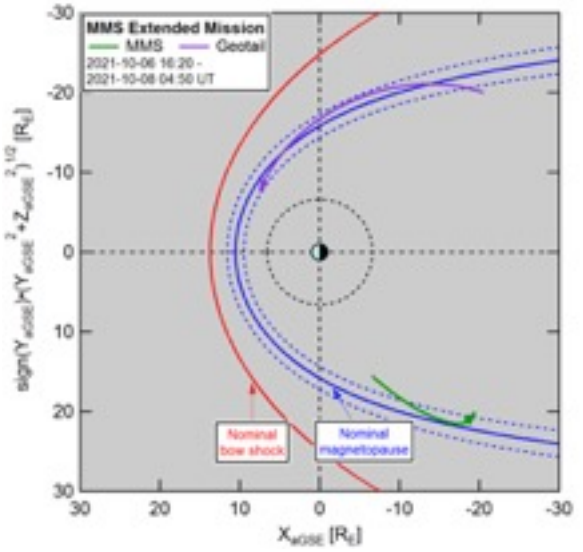




Partial trial of this spacing during the apogee raise

Cross-scale Kelvin-Helmholtz Science: An Example White Paper (4/4)

- How does the Heliophysics Observatory enhance the science return?
  - MMS investigates cross-scale KH on one flank
  - Geotail samples opposite flank simultaneously
  - Combined: system-scale KH investigation



This conjunction lasts more than 1.5 days.