Rutherford
Appleton
Laboratory

Heliospheric Imager (HI)

Richard Harrison

Principal Investigator

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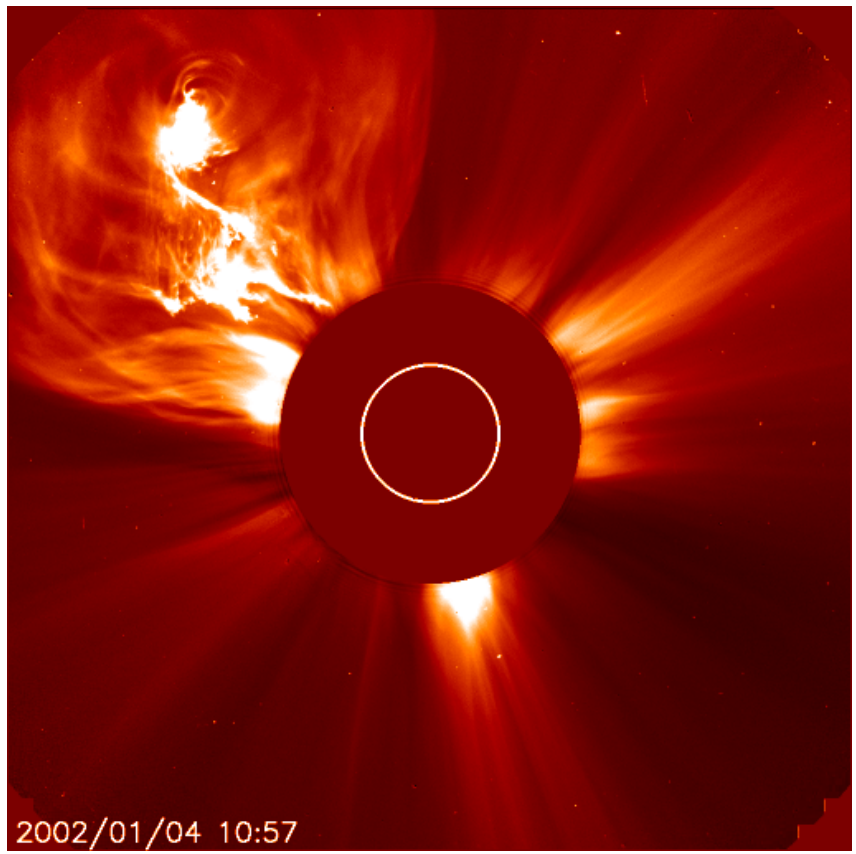
Outline

• HI Overview	Richard Harrison
• HI Optical Design	Jean-Marc Defise
• HI Mechanical Design	Chris Eyles
• HI Structural Analysis	Helen Mapson-Menard
• HI Thermal Analysis	Helen Mapson-Menard
• HI Assembly, Integration, and Test	Chris Eyles

Heliospheric Imager - Overview

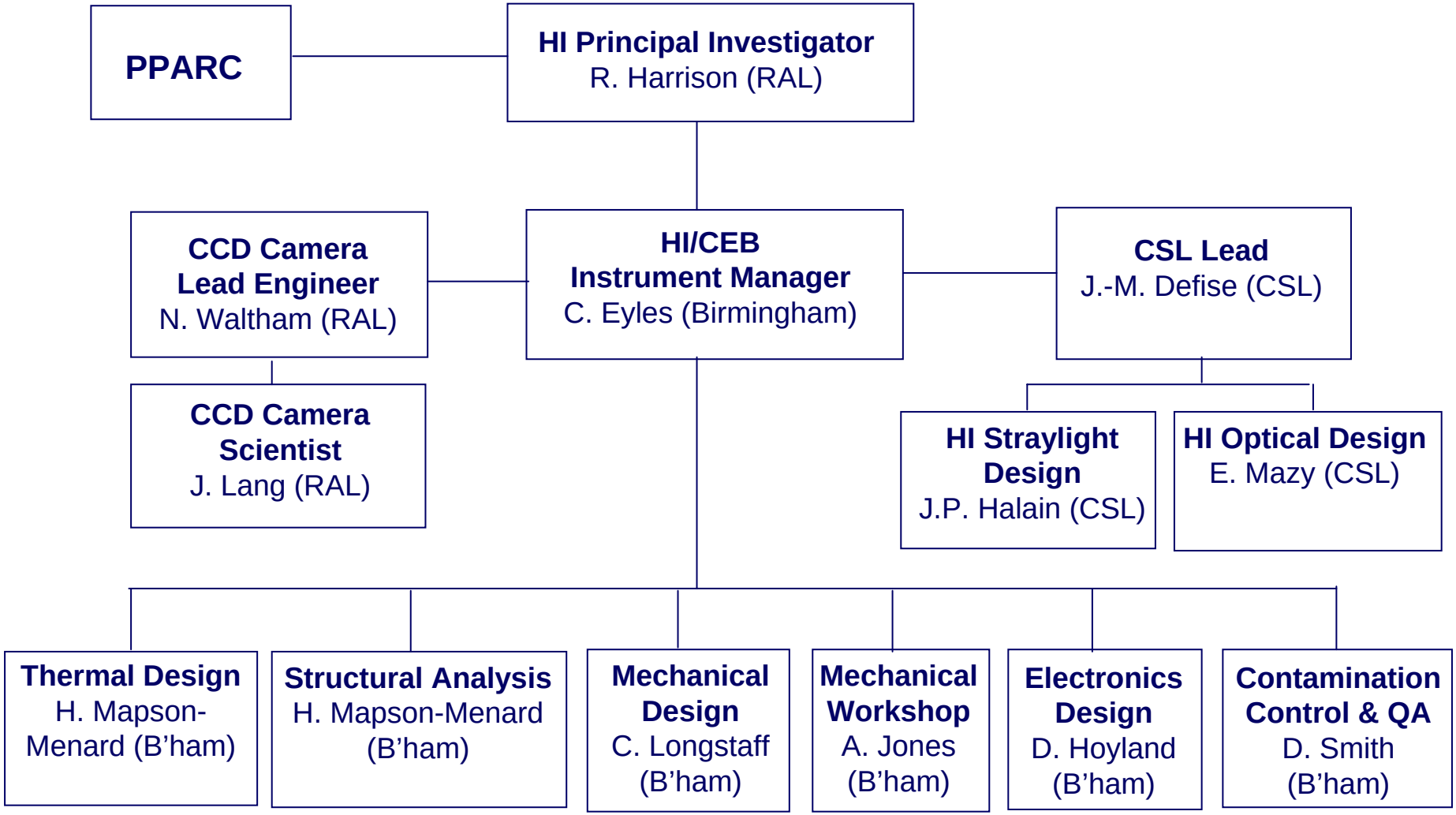
- **First Opportunity to Observe Geoeffective Coronal Mass Ejections (CMEs) Along the Sun-Earth Line in Interplanetary Space - the First Instrument to Detect CMEs in a Field of View Including the Earth!**
- **First Opportunity to Obtain Stereographic Views of CMEs in Interplanetary Space - to Investigate CME Structure, Evolution and Propagation**
- **Method: Occultation and Baffle System, With Wide Angle View of the Heliosphere, Achieving Light Rejection Levels of 3x10-13 and 10-14 of the Solar Brightness**



HI Institute Roles and Responsibilities

- Rutherford Appleton Laboratory
  - PI Institute
  - Leadership of UK STEREO/SECCHI Science Team
  - Support With HI AIT
- University of Birmingham
  - HI Mechanical, Thermal and Electrical Design
  - Fabrication and AIT of HI QM and FMs
  - HI Instrument Management
- Centre Spatial de Liege
  - Optical Design and Test
  - Optical Calibration
  - Straylight Analysis and Baffle Design
  - Support With HI AIT
- Naval Research Laboratory
  - FPA Design (With Swales)
  - HI US Liason (D. Socker)

HI Project Organisation

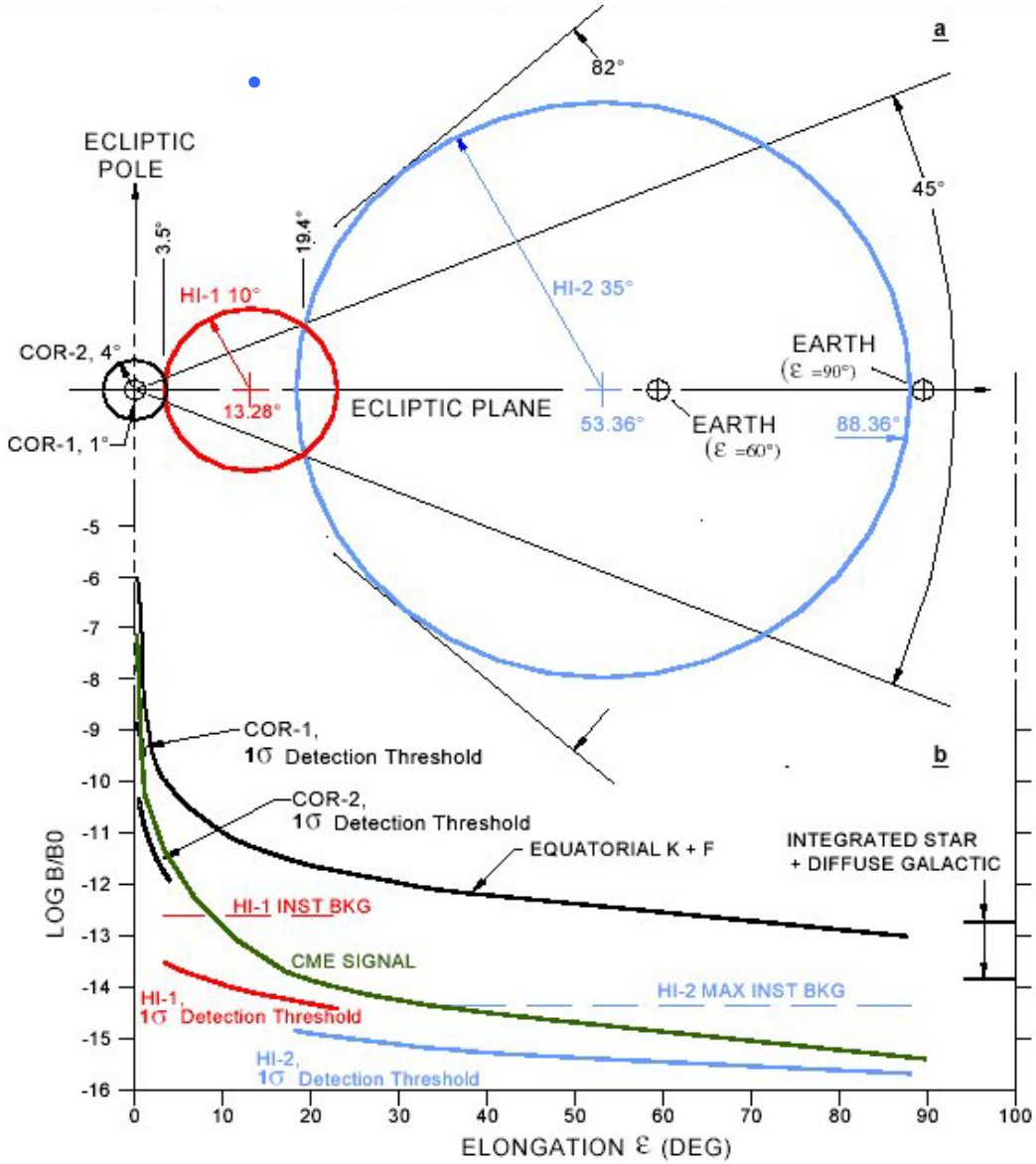


HI Instrument Requirements

	HI-1	HI-2
Instrument Type	Externally-Occulted Coronagraph	Externally-Occulted Coronagraph
Centre of Field-of-View Direction	Along Sun-Earth Line θ = 13.65 deg	Along Sun-Earth Line θ = 53.35 deg
Angular Field-of-View	20 deg	70 deg
Coronal Coverage	12 - 84 R_{sun}	66 - 318 R_{sun}
Overlap With COR2	12 - 15 R_{sun}	N/A
Overlap With HI-1	N/A	66 - 84 R_{sun}
Baseline Image (2 x 2 Binning)	1024 x 1024	1024 x 1024
Image Pixel Scale (Binned)	70 arcsec	4 arcmin
Spectral Bandpass	630 - 730 nm	400 - 1000 nm
Exposure Time	12 - 20 sec	60 - 90 sec
Nominal Images Per Sequence	70	50
Required Cadence (Per Sequence)	60 min	120 min
Brightness Sensitivity	3 x 10^{-15} B_{sun}	3 x 10^{-16} B_{sun}
Straylight Rejection	3 x 10^{-13} B_{sun}	10^{-14} B_{sun}
Brightness Accuracy	10%	10%

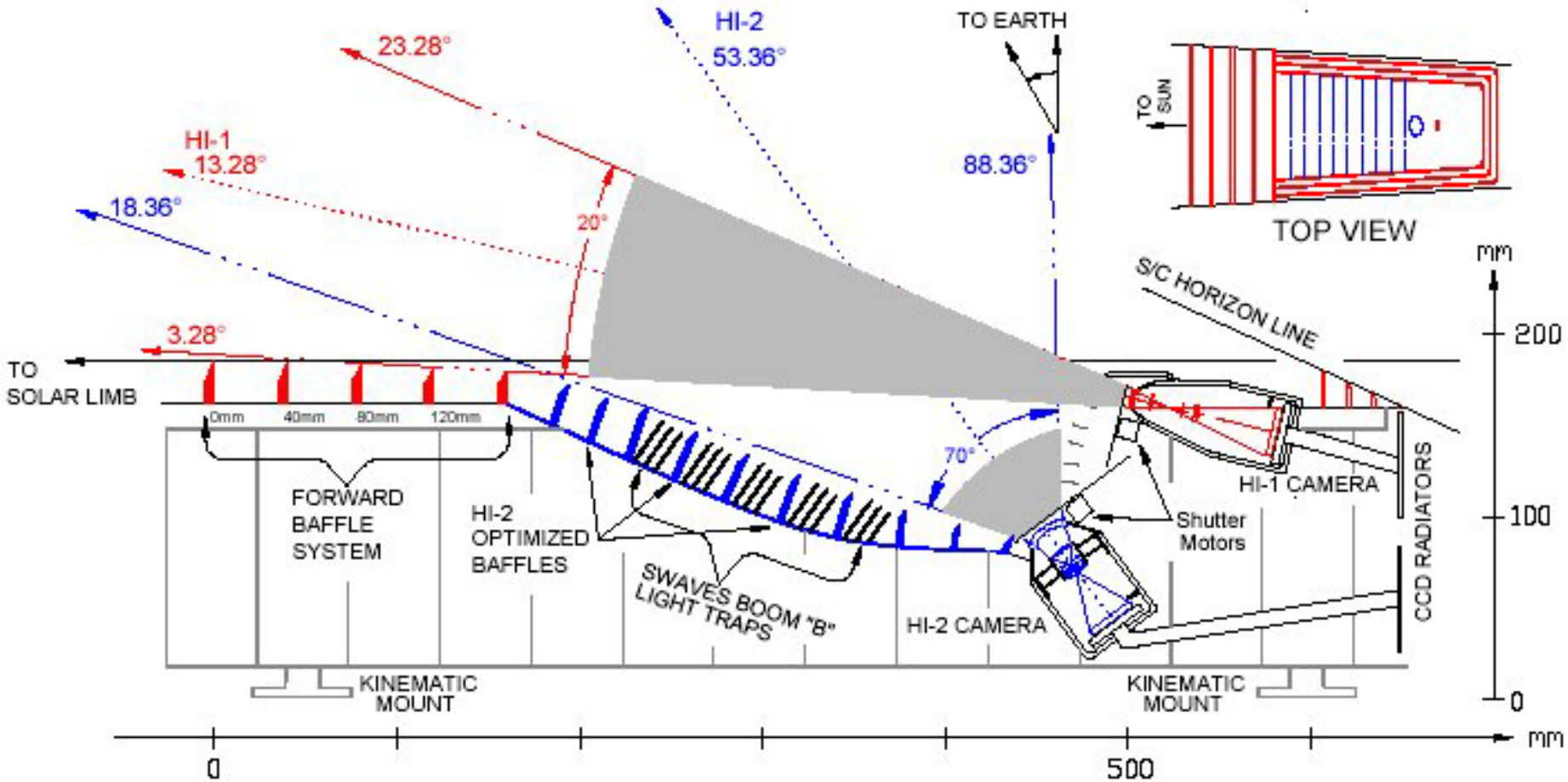
HI Instrument Requirements

- **Geometrical Requirements:**
  - **To View the Sun-Earth Line With Unbroken Coverage From Corona to Earth Orbit**
  - **Opening Angle of 45 Degrees Governed by Average CME Width Over Equator**
- **Brightness Levels:**
  - **Need to Achieve Rejection to < 3x10-13 & < 10-14 B/Bo to Detect CME Signal**
  - **Have to Contend With Contributions From the F-Corona, Planets, Stars, the Earth and Moon**



HI Assembly Overview

The Original Design Concept



HI Assembly Overview

The Current Design