Cosmic Dawn Intensity Mapper (CDIM): Instrument and Mission Design

Stephen Unwin (Jet Propulsion Laboratory, California Institute of Technology) and the CDIM Science and Design Teams

CDIM answers critical questions:
- How and when did galaxies and quasars first form?
- What is the history of metal build-up?
- What is the history and topology of reionization?

- Every wide-field image contains spectral data for every object
- For each object, spectrum is reconstructed from multiple images stepped across the field (total of 1680 steps)
- A complete spectrum is observed for every object in instrument field

CDIM Instrument and Survey Design

- Spectroscopy: Spectral imaging using Linear Variable Filters (LVFs)
- Spectral range: 0.75 µm – 7.5 µm with resolution R=300
- Telescope: 3-mirror all-reflective design with 0.8-m aperture
- Detectors: Infrared H2RG arrays (2048 pixels) in a 4 x 6 array
- Cooling of telescope
- Observing mode: Integrate – small step (15") – Integrate – small step (15")
- Flight system orbit: Sun-Earth L2
  - Very stable thermal environment
  - Minimal observing constraints (except Sun)
- Survey areas: well-studied fields with low sky background
  - Deep: 15 degree (North or South Ecliptic Pole)
  - Medium: 30 degree (Extended Chandra Deep Field South)
  - Wide: 300 degree (North or South Ecliptic Pole)
- Duration: 4-year prime mission
- Guest Investigator Program: During extended mission

Science Team

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Patrick Morrissey, JPL (Instrument)  
Nasrat, JPL (Thermal design)  
Eric Sunada, JPL (LVF filters)  
James McQuade, JPL (Optical design)  
Sarah Lipczyk, Ball Aerospace (spacecraft)

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CDIM at the AAS

Cosmic Origins (COPAG) Meeting, Sunday, January 6, 3:15pm-6:00pm, Room: 4C-3
- Updates from Cosmic Origins-related Probe Studies

Poster Session 158 – Space Mission Instrumentation II, Monday January 7, 9:00-12:00pm, Hall 4A
- 158.04: Stephen Unwin et al. "Cosmic Dawn Intensity Mapper (CDIM): Instrument and Mission Design" (this poster)
- 158.07: Tzu-Ching Chang et al. "Cosmic Dawn Intensity Mapper (CDIM): a New Probe of Cosmic Dawn and Reionization"