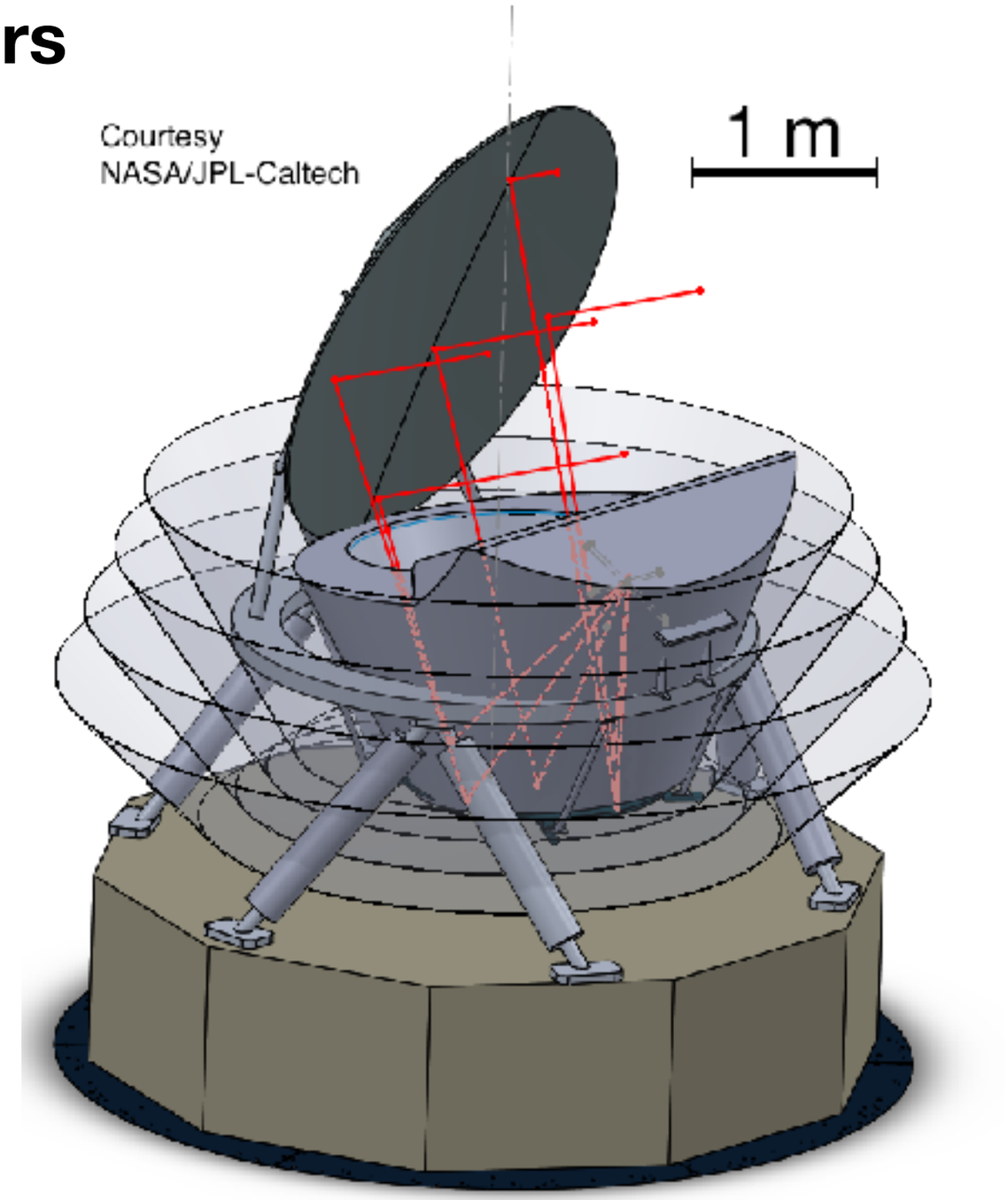
TeamX Summary

Overview

- **Systems**
- **Focal Planes and Detectors**
- **Electronics**
- **Thermal**
- **Configuration**



Systems

- **Strengths**
  - Similar to Planck
- **Weaknesses**
  - *Logistically complicated I&T not explored during this study*
    - Challenging alignments requiring multiple thermal vacuum events and significant OGSE
    - Potential challenges because the instrument is built inside the telescope and there are a number of different thermal environments
- **Future Opportunities**
  - Potential to use spare MIRI cooler
- **Future Threats**

Focal Plane and Detectors

- **Strengths**
  - TES Heritage
  - Low 1/f
  - Multiple possibilities for detectors and readout
- **Weaknesses**
  - Muxed TES of this design not yet demonstrated in space
  - Some detector requirements not yet demonstrated
  - Little work done on reducing impact of cosmic rays
- **Future Opportunities**
  - multi-scale pixels could further reduce focal plane area
  - MKIDs gaining TRL
- **Future Threats**
  - *cosmic ray impact not understood for new designs*

Electronics

- **Strengths**
  - High level of integration, low power components and ease of implementation
- **Weaknesses**
  - commercial parts with potential operating temperature and reliability limitations
- **Future Opportunities**
  - higher level of integration including ASIC implementation
- **Future Threats**

Optics

- **Strengths**
  - Advanced surfaces allow performance improvements
- **Weaknesses**
  - mechanical mounting of and thermal loads on the focal plane need to mature
- **Future Opportunities**
  - Could support more detectors, if there was more funding
- **Future Threats**

Thermal

- **Strengths**
  - Ample capability margin for coolers
- **Weaknesses**
  - Using 3He may affect cooler I&T cost and thus I&T flow
- **Future Opportunities**
  - Due to low 4.5 K load, perhaps baseline MIRI-cooler clone using 4He
  - Us MIRI spare cooler with 3He
  - wire conduction to 100 mK could be greatly reduced
  - JT and Stirling stages could be better balanced
- **Future Threats**

Mechanical

- **Strengths**
  - Simple, low risk, minimal design complexity
  - inherent high stiffness and stability
  - no sensitivity to growth to (reasonable) growth in focal plane / mirror area or mass
- **Weaknesses**
  - Requires careful thermal design
  - *Requires well thought out optics alignment*
- **Future Opportunities**
  - Use of 3D printing
  - Design room for light-weighting using composite material
- **Future Threats**

Configuration

- **Strengths**
  - Modular design
  - Optimal angles of alpha, beta for given component sizes
- **Weaknesses**
  - No attachment for the 4 K and 18 K boxes yet
- **Future Opportunities**
  - deployable radiators to increase alpha
  - more details about attachment and calibration
- **Future Threats**
  - No volume margin for the primary mirror