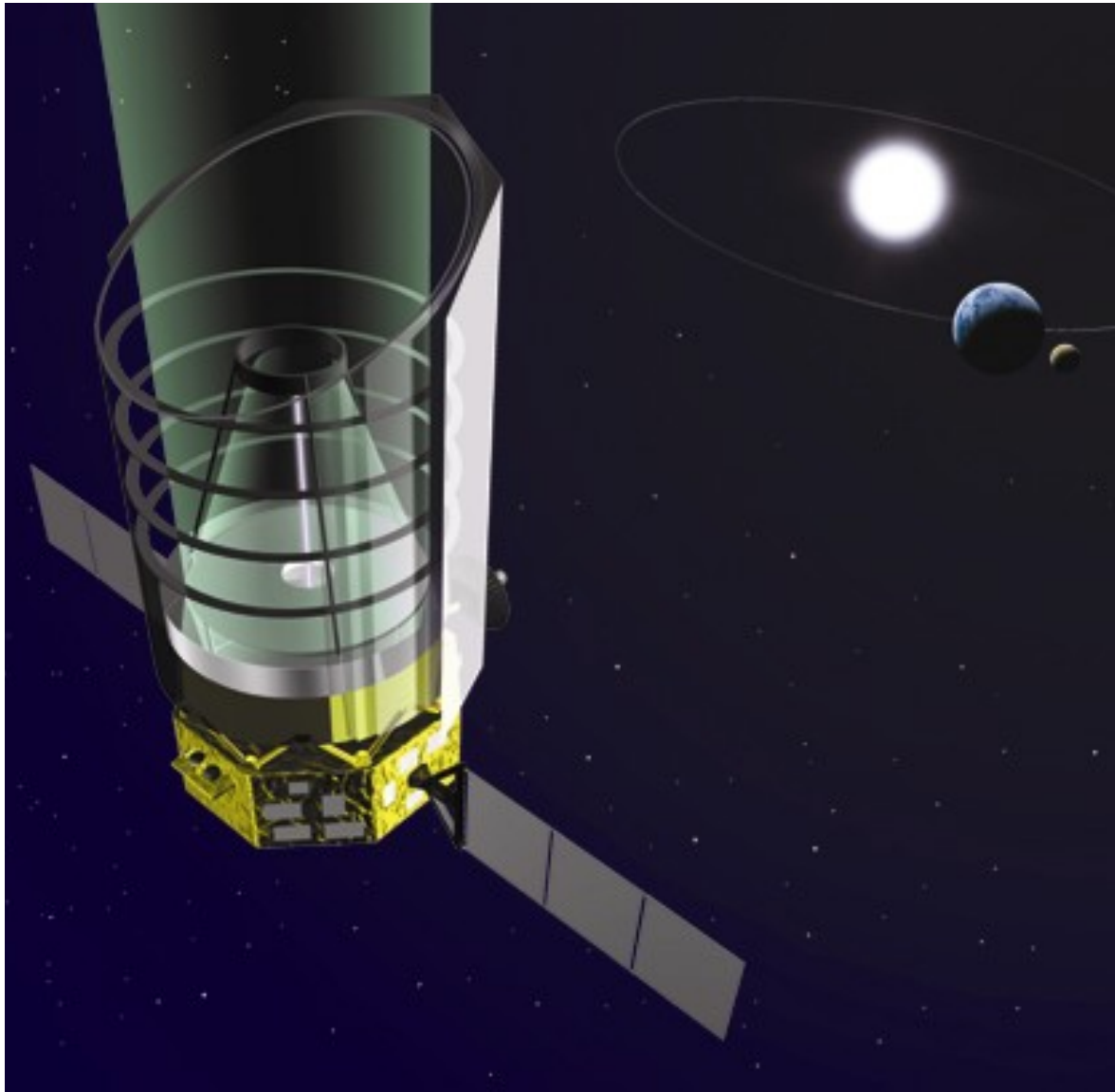




SPICA -- THE FIRST LARGE CRYOGENIC OBSERVATORY



Space Infrared Telescope for Cosmology and Astrophysics

Takao Nakagawa, PI

- **COOLED Telescope**
 - Optimized for Thermal IR (10-600 μm)
 - Complementary with JWST, ALMA
- **Size:** 3.2 m (No Deployment)
- **Temperature:** <6 K
Stirling + J-T closed cycle
- **Facility heat lift**
at 1.7 K: 10 mW
- **Orbit:** L2 Halo
- **Lifetime:** 5 years +
- **Launch:** ~2019 by HIIA-202

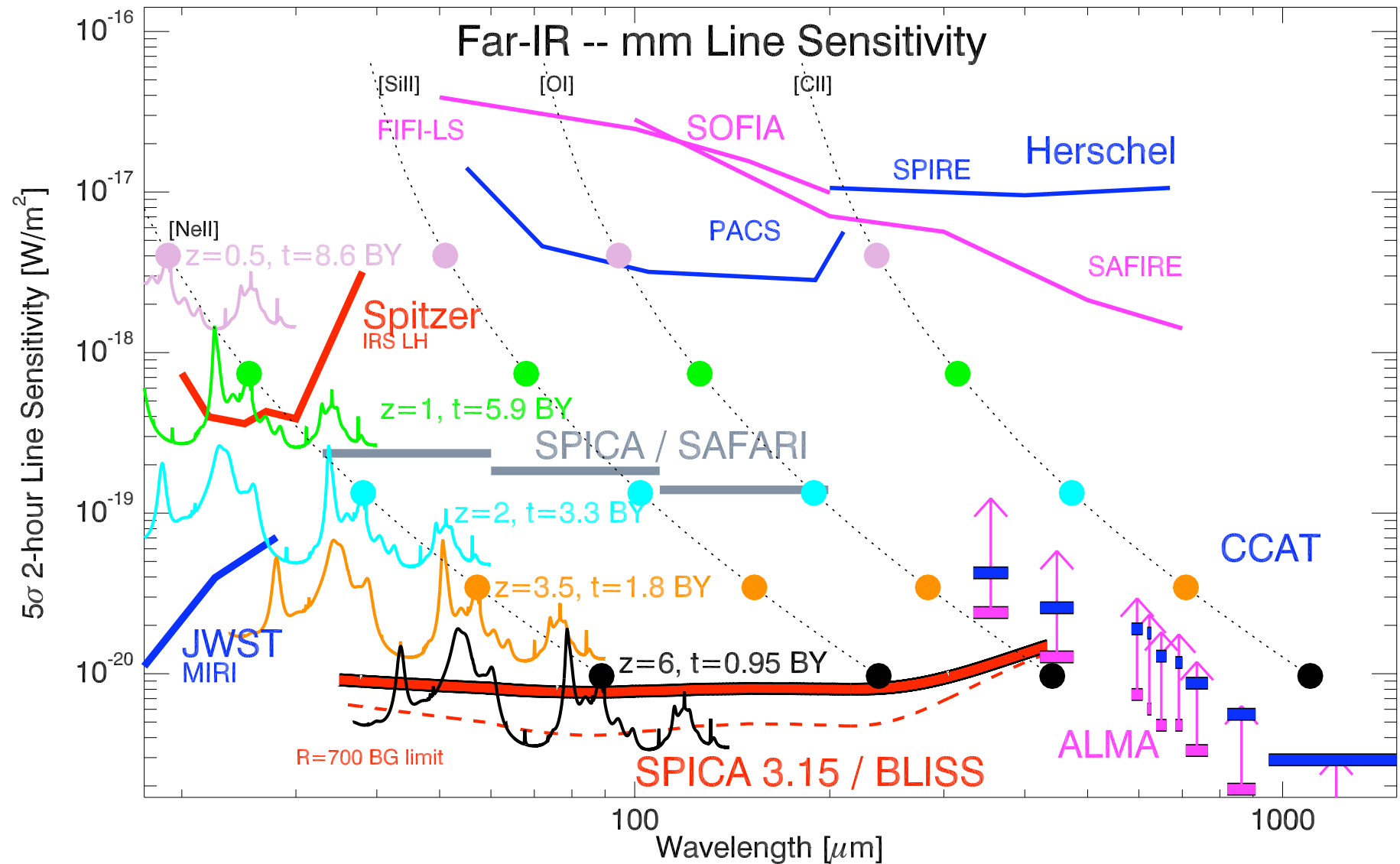
A major international mission

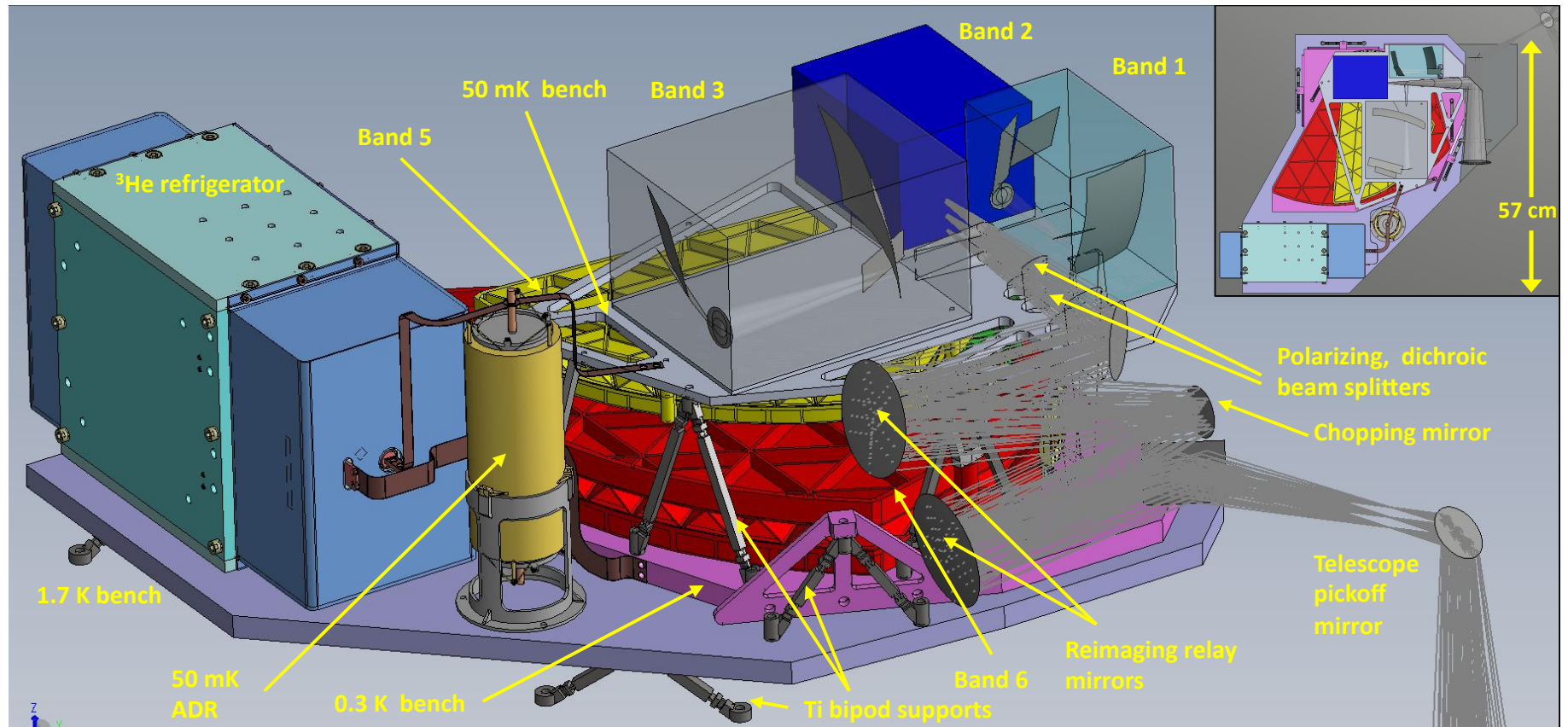
European consortium developing
SAFARI (SRON lead) and
telescope (ESA)

Focal plane instrument definition
and allocations underway
now.



BLISS DESIGNED FOR DEEP FOLLOW-UP SPECTROSCOPY

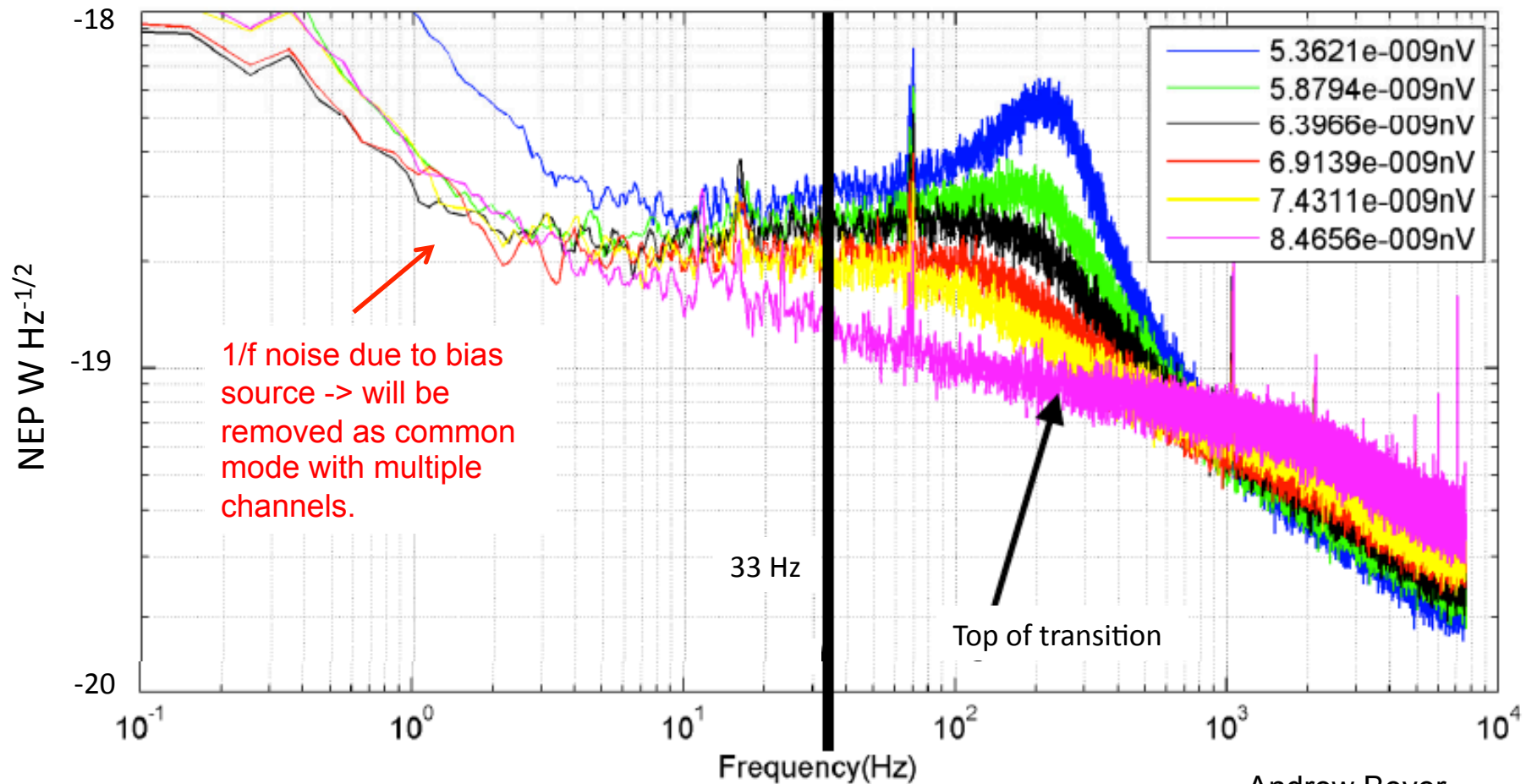




- Goal: measure a galaxy's full spectrum from 35-433 microns simultaneously.
- 6 bands, each with **two R>400** broadband grating modules (12 total)
- **4224** superconducting bolometers with time-domain SQUID MUX
- Assembly cooled to 50 mK with a **2-stage magnetic + 3He sorption refrigerator**, supported with a titanium suspension.
- Bolt and go, no moving parts except for chopping mirror in feed optics.
- **Specs:** 50x50x40 cm³, **30 kg** (cold). JPL cost ~\$150M



BLISS DETECTOR DEVELOPMENT: LOWEST NEPs EVER ACHIEVED WITH SQUID MUX



NEP: $\sim 2 \times 10^{-19} \text{ W}/\text{Hz}^{1/2}$ for $T_c = 150 \text{ mK}$.

65 mK tests underway now, expect below 1×10^{-19}

Still much work to prepare for flight.

Andrew Beyer,
Matt Kenyon,
Pierre Echternach,
Warren Holmes,
Talso Chui (JPL)