Next-generation thermal infrared multi-body radiometer experiment (TIMBRE). M. Kenyon[1], G. Mariani[1], B. Johnson, E. Brageot[1], and P. Hayne[1] [1]Jet Propulsion Laboratory, 4800 Oak Grove Dr., Pasadena, CA 91109, mkenyon@jplnasa.gov

Introduction: We have developed an instrument concept which is a next-generation Thermal Infrared Multi-Body Radiometer Experiment called TIMBRE. TIMBRE is build around a new focal plane architecture consisting of a 128 x 64 element array of thermopiles and incorporates an optical design with a novel intentional aberration [1] at the intermediate focus which reduces the size of the optical bench by a factor of 2 over a conventional design.

TIMBRE is a versatile instrument that makes spectral maps of terrestrial surfaces and atmospheres with wavelengths ranging between ~1-100 um. It belongs to a class of important instruments called thermal imaging radiometers (TIRs) that provide high priority science as demonstrated by the inclusion of this class of instrument on Pioneer 10 \& 11 (Infrared Radiometer), Voyager (IRIS instrument), Viking Orbiter (IRTM), Cassini (CIRS), Mars Odyssey (THEMIS), Mars Reconnaissance Orbiter (MCS), Lunar Reconnaissance Orbiter (Diviner), and Europa Clipper (E-THEMIS). TIRs are also included on the model payload for New Frontiers 4 & 5 missions [Trojan Tour and Rendevous (TTR), Comet Surface Sample Return (CSSR), Io Volcano Observer (IVO)] and proposed Discovery missions (BASiX) [2].

The power of a TIR is determined by several properties including the capacity to measure faint signals (e.g. sensitivity), the spatial resolution, the number of spectral channels, radiometric accuracy, and the swath width or coverage of the instrument as it passes over a target. In terms of these properties, MCS, Diviner, and THEMIS are the gold standard currently flying and have provided breakthrough science by measuring the infrared/far-infrared (~1-100 um) properties of Mars and the Moon; however, these instruments suffer from limitations in both spatial resolution and sensitivity at low temperatures (i.e. > 200 K) due to limitations in the focal plane.

TIMBRE overcomes these shortcomings by incorporating a diffraction-limited and sensitive modern thermopile array and an optical design with a novel intentional aberration to achieve an instrument with unparalleled performance.

TIMBRE is specifically designed for demanding future missions to small bodies (e.g. NEO, main-belt comets, Trojan asteroids), planets (e.g. Jupiter, Mars, Venus), and satellites (e.g. Io).

References: [1] W. Johnson *et al.* (2015) NASA New Technology Report 49552. [2] R. C. Anderson *et al.* (2014) *45th Lunar and Planetary Science Conference*, *1571*, A74.