Achieving High Angular Resolution in the Far-IR

The path to space-based interferometry

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A Broad Science Argument
"A rational coordinated program for space optical and infrared astronomy would build on the experience gained with NGST to construct SAFIR, and then ultimately, in the decade 2010 to 2020, build on the SAFIR, TPF, and SIM experience to assemble a space-based, far-infrared interferometer."
The Path in 2000
Past

Ground-based interferometers
• Keck-I
• LBT-I
• VLT-I
• CHARA
• NPOI

Testbeds:
• WIIT (Wide-field)
• Cardiff (FIR)
• UCL (Thermal)
• Lethbridge (Phase cal.)
SPIRIT and FIRI

SPIRIT, circa 2009

FIRI, circa 2014
All national missions in the Visionary Era are interferometers, and technology maturation of interferometric techniques is thus highly relevant to realizing the science vision.

The technical requirements for interferometry in the FIR are not as demanding as for shorter wavelength bands, so FIR interferometry may again be a logical starting point that provides a useful training ground while delivering crucial science.

To peer into young star-forming regions on scales of a few thousand light-years will require high-spatial-resolution observations from a space-based far-infrared interferometer.”
BETTII (Balloon Experimental Twin Telescope for Infrared Interferometry)
BETTII: A bad landing

28 June 2017
Houck Workshop, Ithaca NY
The Path (?)
The Future

Space High Angular Resolution Probe for the Infrared (SHARPIR)
Conclusions

• High angular resolution will open new scientific doors
  – Only achievable with interferometry

• Interferometry faces serious challenges
  – Perception problems!
  – Conflicting desires – bigger, or smaller?

• Next steps
  – Plan (hope) to rebuild BETTII (BETTII2)
  – Study the SHARPIR concept
  – Simulations of interferometric capabilities
  – Continued work with testbeds