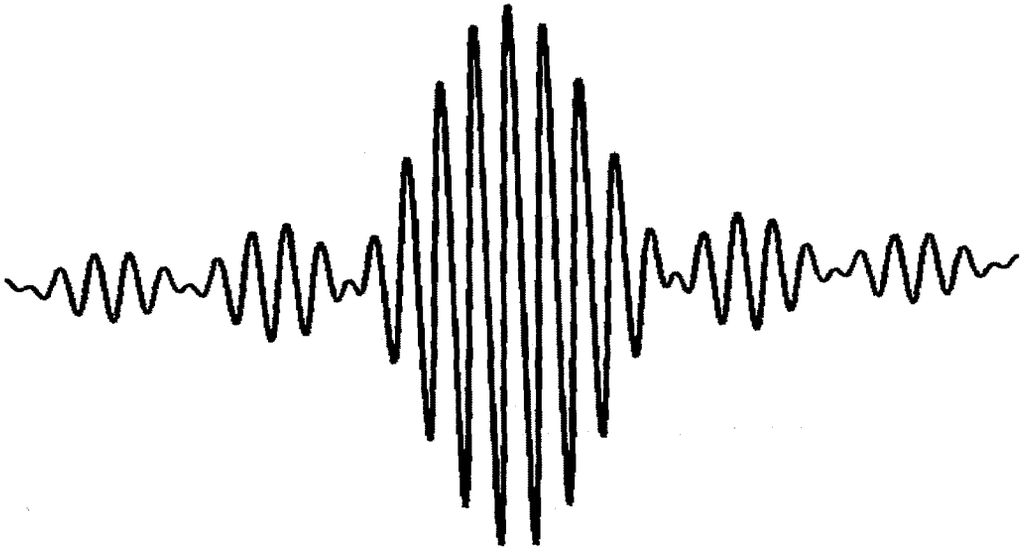

Observations of YSO's with infrared interferometers

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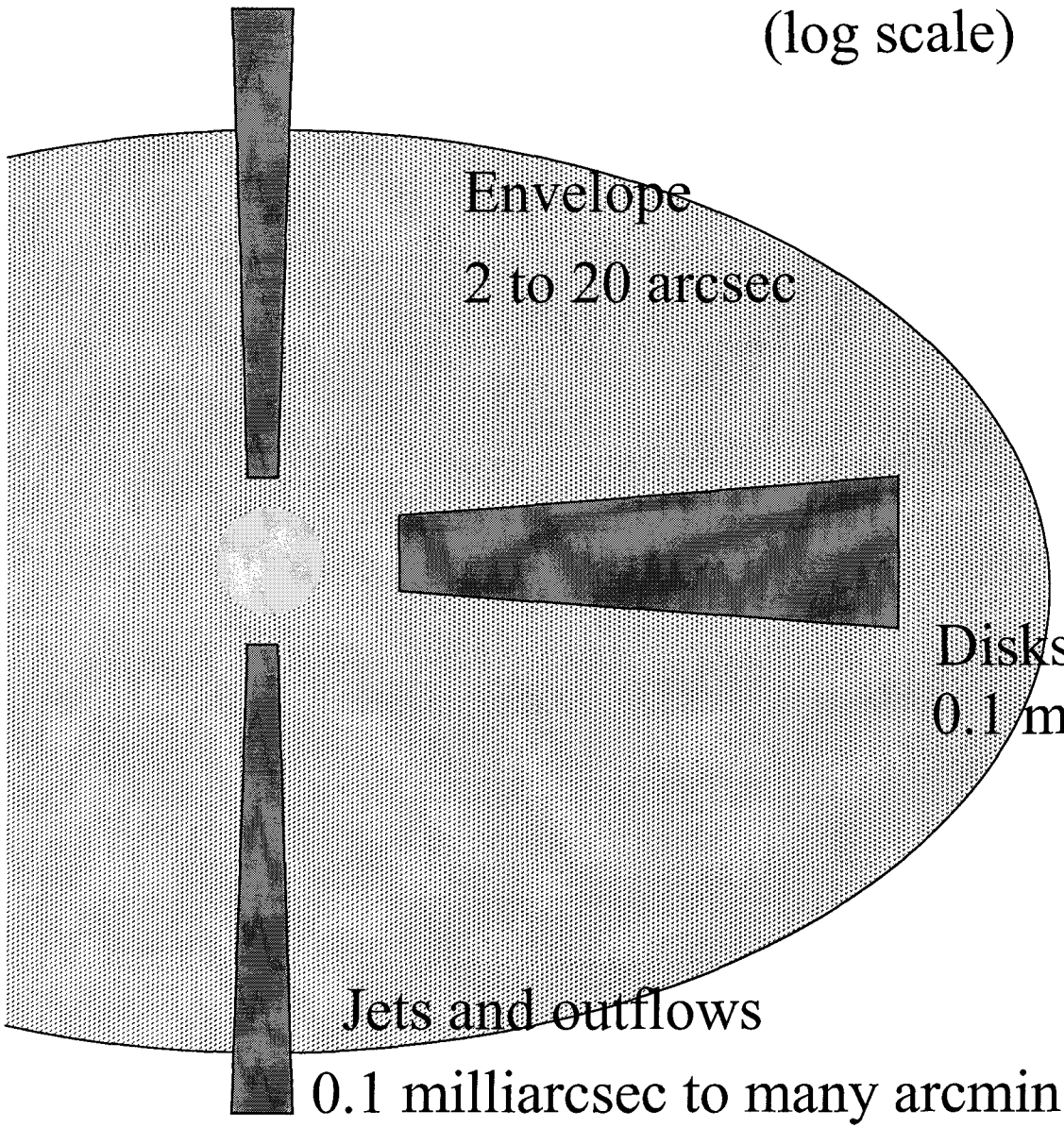
Angular scales at 50 AU

(log scale)



Why infrared interferometry for YSOs?

- Infrared emission traces the hot dust in disks etc.
- Embedded stars easier to observe in infrared
- Inteferometry allows much higher resolution
  - 100 meters at 2 um is 4 milliarcsec = 0.2 AU

Infrared interferometry

- Direction detection of fringe instead of heterodyne (except ISI)
- Observing modes include
  - Amplitude
    - Stellar diameters, emission region sizes, binaries
  - Astrometry
    - Binary orbits
  - Imaging

Existing and upcoming ground-based facilities

	Number of elements	Element aperture (m)	Max baseline (m)	Wavelengths (μm)
GI2T	2	1.5	35	0.4-0.8,1.2
COAST	5	0.4	100	0.4-0.95,2.2
SUSI	13	0.14	640	0.4-0.66
IOTA	3	0.45	38	0.5-2.2
ISI	3	1.65	30	10
NPOI	6	0.6	435	0.45-0.85
PTI	2	0.4	110	1.5-2.4
CHARA	6	1.0	350	0.45-2.4
Keck	2(4)	10(1.8)	165	2.2-10
VLTI	2(3)	8.4(2.5)	200	0.45-12

YSO observations and results to date

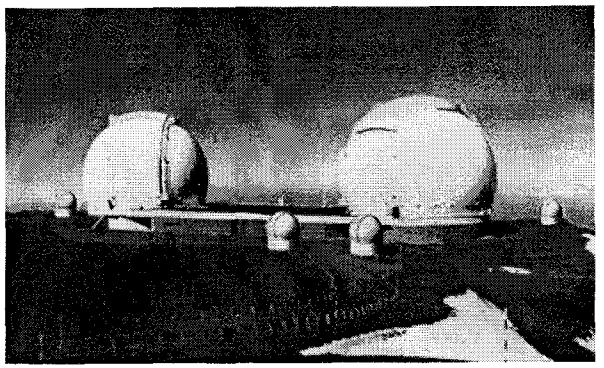
- T Tauris
  - AB Aur (Millan-Gabet et al, 1999) with IOTA + PTI
  - T Tau, SU Aur (Akeson et al, 2000) with PTI
  - General result: Disk emission is resolved on scales of tenths of AU at 2.2 μm
    - Larger than predicted by SED models
- FU Ors
  - FU Ori (Malbet et al 1998) with PTI
  - General result: Consistent with accretion disk

Observations cont.

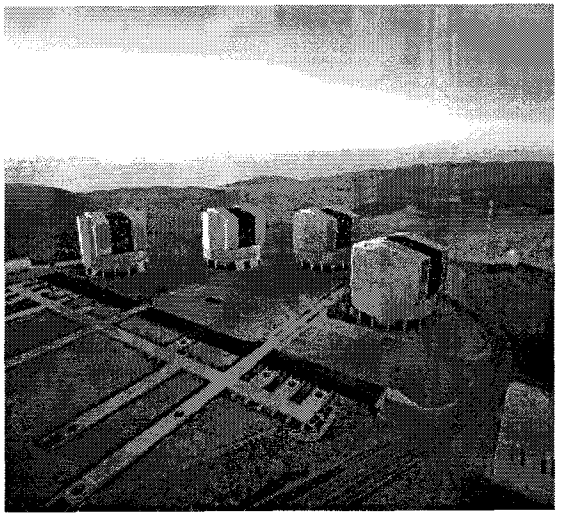
- Herbig Ae/Be
  - Survey of 15 systems by Millan-Gabet et al (2001) with IOTA
  - Resolved emission from 11 sources
    - One new binary
  - NOT consistent with accretion disk models
  - Emission regions larger than expected

What the next generation will do

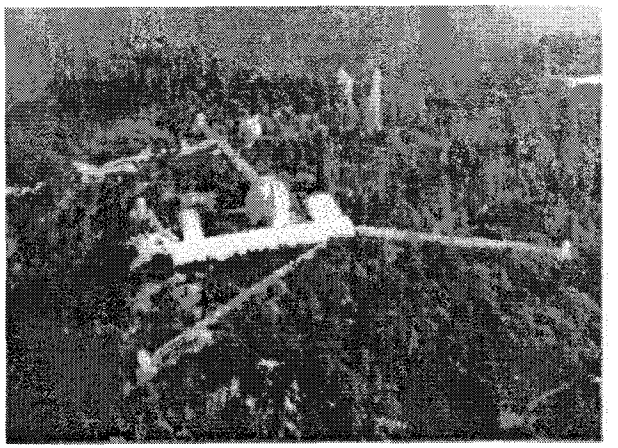
Keck



VLTI



CHARA



- Capabilities:
  - More sensitivity (e.g. K<14 at Keck)
  - Imaging (all the above are planning on imaging with 6 or more elements)
    - A 100 m baseline at 2 μm gives 4 milliarcsec resolution

Next generation cont.

- Special modes
  - Nulling
    - Removes fringe from star, allows observation of surrounding material
- What they can look at
  - Imaging disks with ~0.25 AU resolution
    - gaps, asymmetries etc.
  - Multiplicity
    - Orbital determination on separations up to tens of milliarcsec
    - Can determine mass when combined with radial velocity
  - Jets/outflows