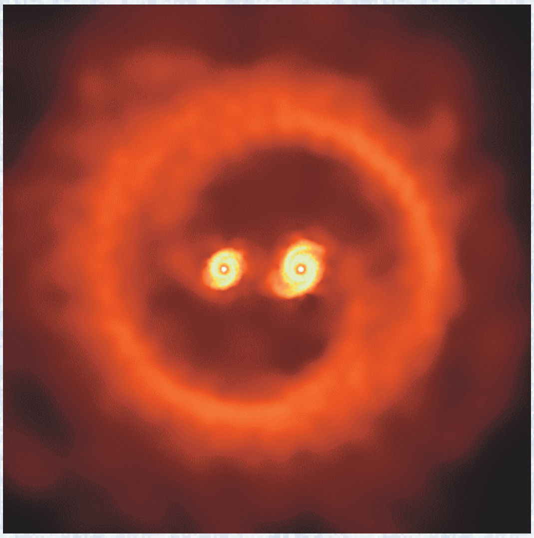

AIP

Why we need to combine interferometry at different wavelengths?

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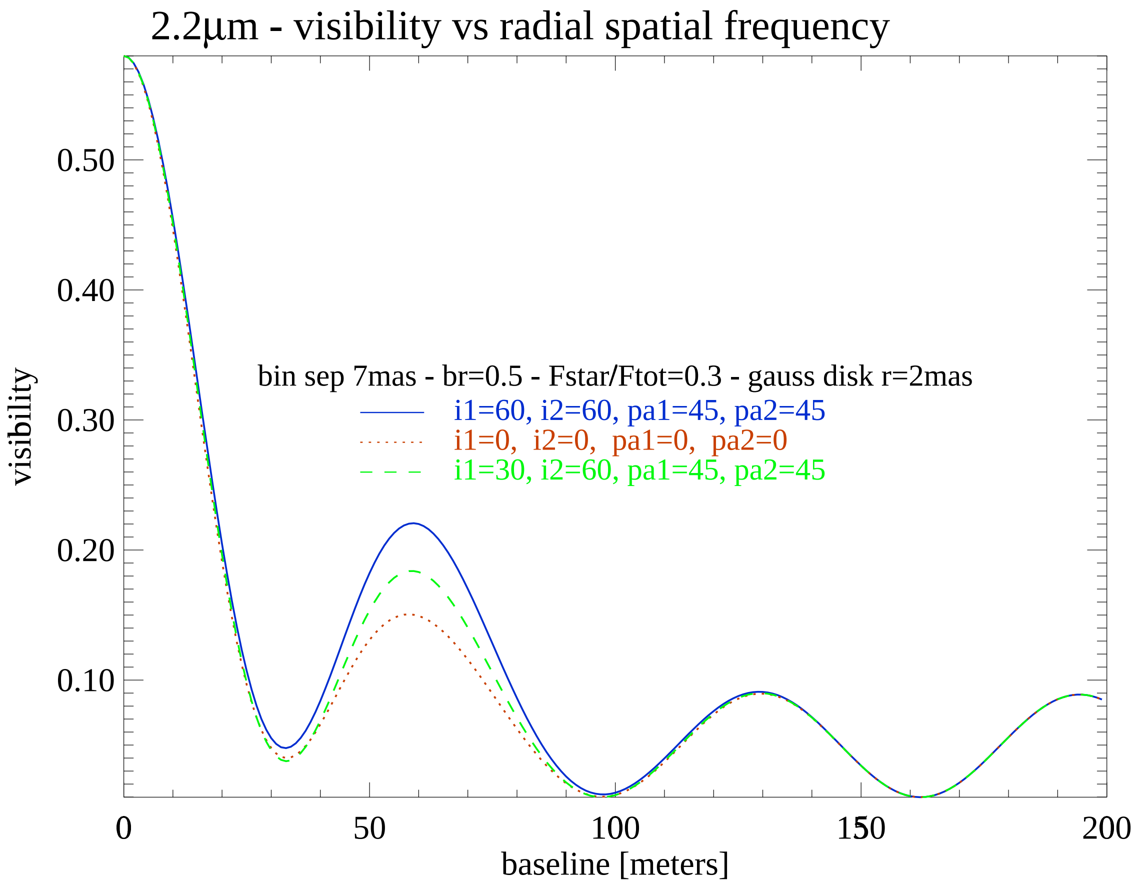
Ringberg
MIDI Workshop
1 – 5 September 2003

The case for multi-wavelengths long-baseline interferometry

1. determine the diameters of young stars, in continuum and abs/em lines (--> atmosphere, magnetosph. accretion)
2. resolve the inner edges and sizes of circumstellar disks, both in low-mass and high-mass stars with IR excess
3. resolve the infrared colours and luminosities of the stars in young close binaries without IR excess (JHK)
4. resolve infrared excess (JKN) on close young binary stars with IR companions and protostellar jets (e.g. Z CMa)
5. determine the gaps and sizes of circumbinary disks around young spectroscopic binaries (e.g. AK Sco)
6. locate the PAH vs. silicate emission in HAeBe star disks (low spectral resolution observations with MIDI)
7. try to observe face-on silhouette disks and proplyds in the Orion Trapezium Cluster (--> grain properties)
8. resolve microlensing systems in the Galactic Bulge (achromatic events, cf. Delplancke et al. AA 375, 701)
9. try λ-differential measurements (spectro-astrometry), e.g. in H_20 or CH_4, to resolve giant planets in orbit

PS. Apart from VLTI (MIDI and AMBER), the use of LBT-I (LINC/NIRVANA, NULLER) should also be considered (23.8m baseline).



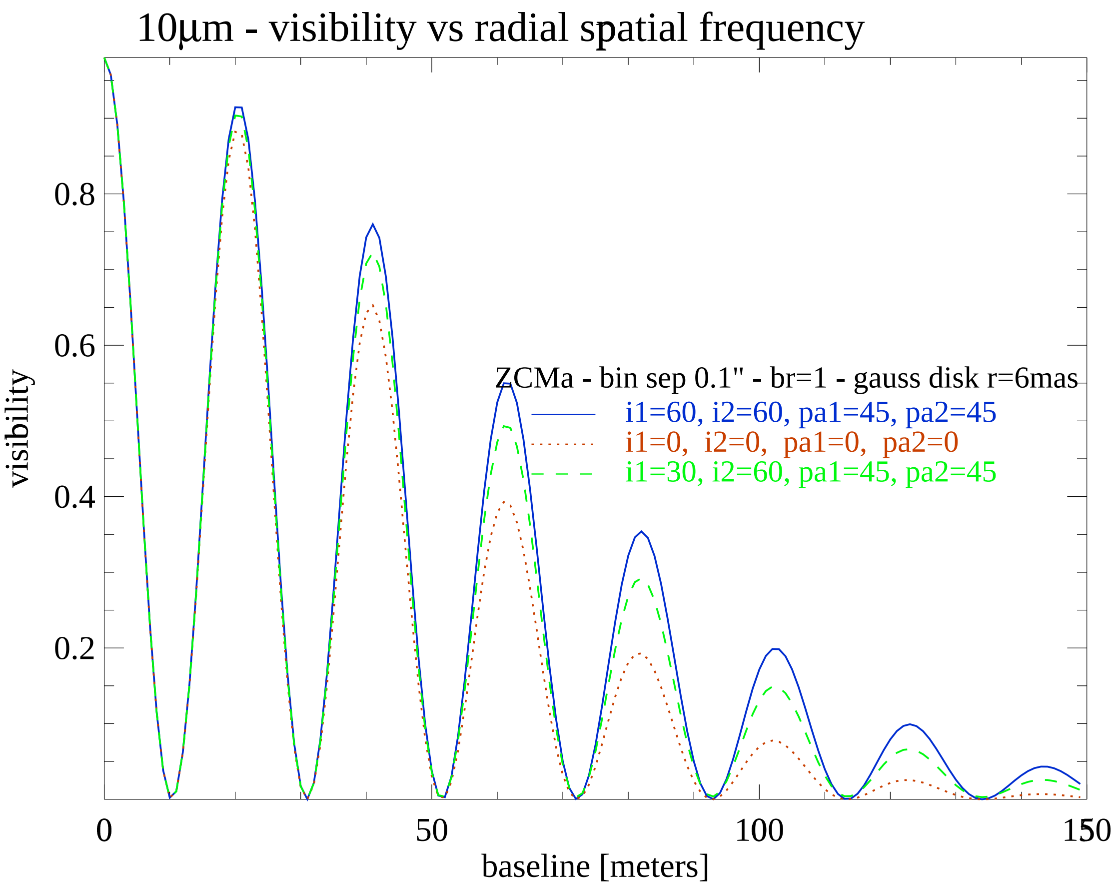


Figure 1: Example of visibility cuts of young binaries with circumstellar accretion discs exhibiting various orientations as observed at 2.2 μm (up) and at 10 μm (down). The cut is oriented along the separation vector, i1,2 and pa1,2 stand for the inclination and position angle of the inclination of the disks with respect to the plane of the sky, and br is the brightness ratio of the binary. At 2.2 μm the assumption is that the unresolved photospheric flux contributes 30 % of the total flux for each star+disk (simulation by S. Correia).

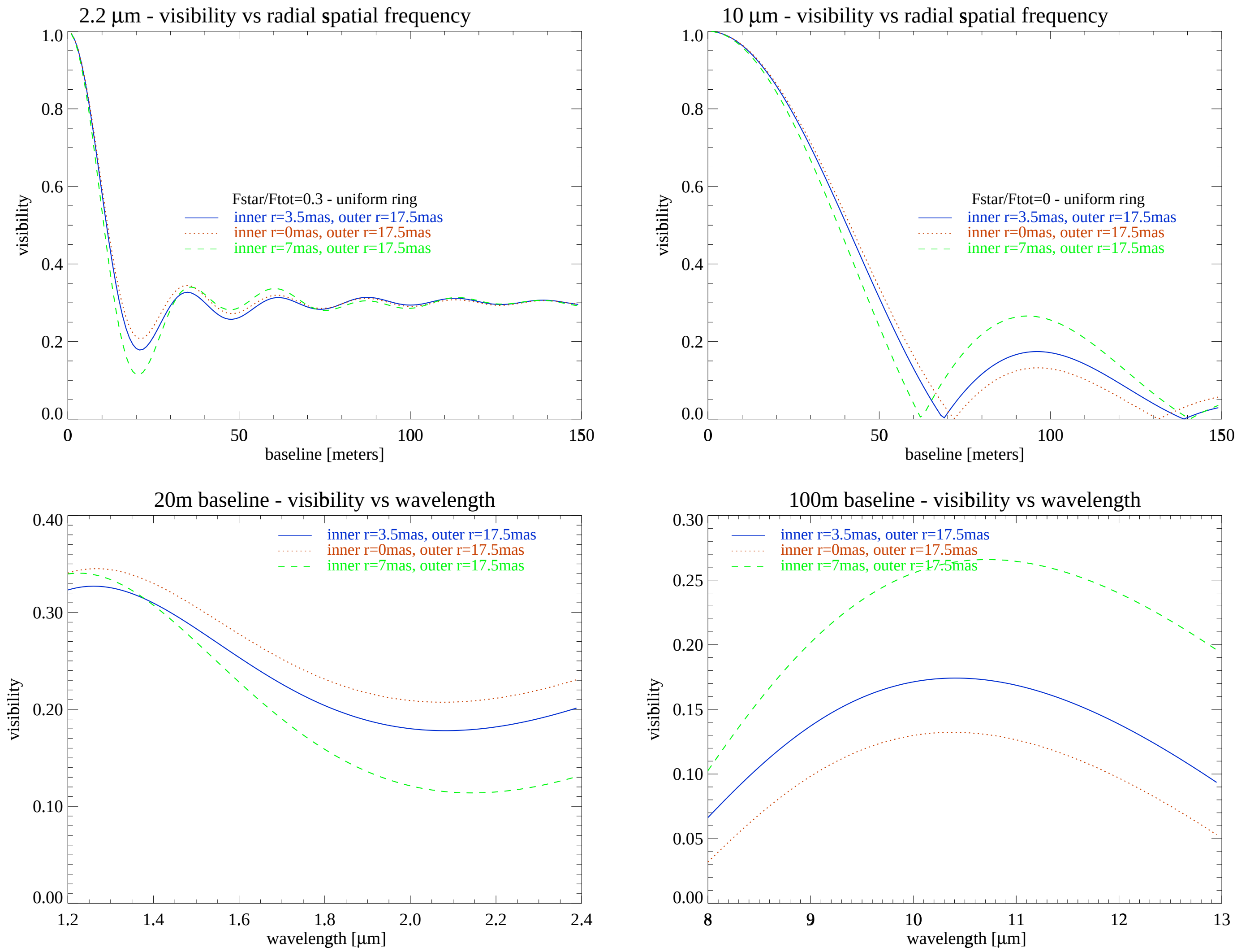


Figure 2: Example of visibility curves of an unresolved star with a circumstellar accretion disc modeled by an uniform ring with an inner boundary radius of different size as observed at 2.2 μm (left) and at 10 μm (right). Upper plots correspond to visibility cuts as a function of spatial frequency (expressed in projected baseline length) and below are visibilities as a function of observing wavelength in the JHK range (left) and Nband (right), for 20 m and 100 m projected baseline respectively. At 2.2 μm the assumption is that the unresolved photospheric flux contributes 30 % of the total flux for the star+disk (simulation by S. Correia).