



first results from DEBRIS: imaging comet belts of nearby stars

Jane Greaves

on behalf of

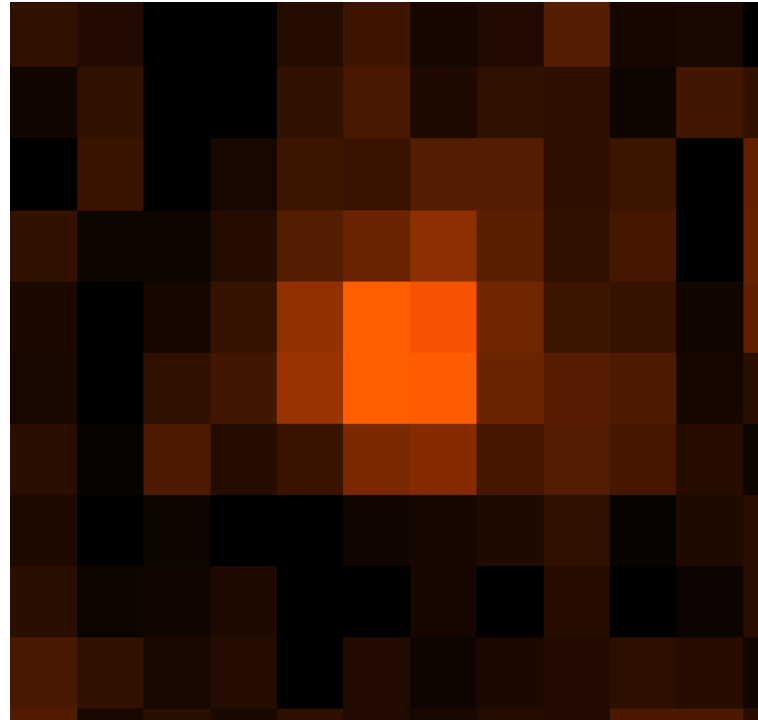
Brenda Matthews (PI)

& the first-look team (Bruce Sibthorpe, Neil Phillips, Grant Kennedy, Laura Churcher, Amaya Moro-Martin & Mark Wyatt)

& the DEBRIS Consortium



first dust!



- AOT verification data for two stars taken in PACS photometry mode in September



survey goals

- explore the origins and evolution of comet belts around nearby stars
 - why so diverse? like or unlike the Sun's Kuiper Belt? relation to planets?...
- for SDP: stars with known debris
 - check fluxes, feasibility, etc.
 - first images of some debris discs only a few parsecs away!

SDP targets

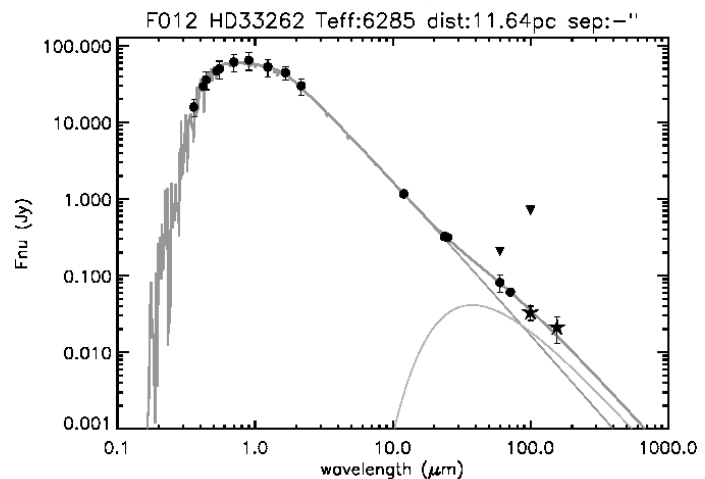
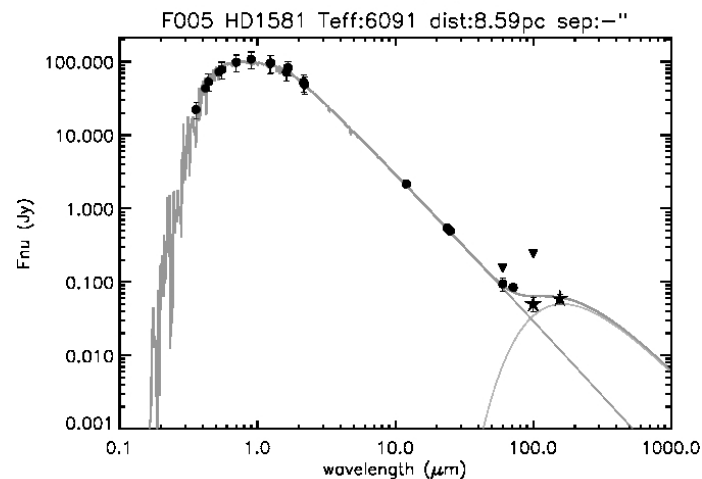
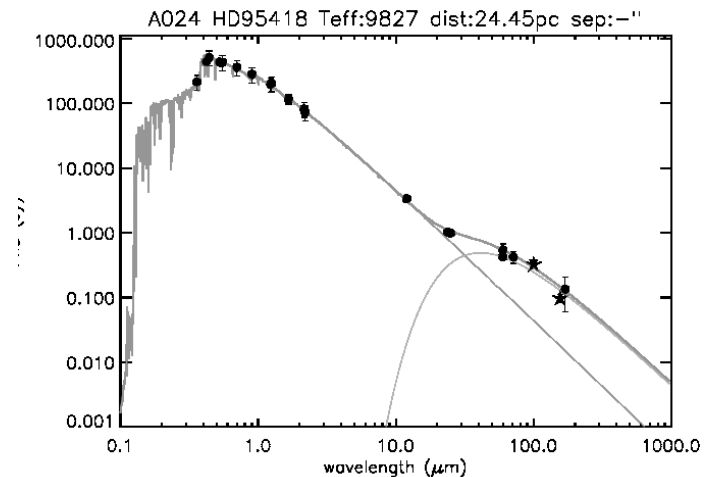
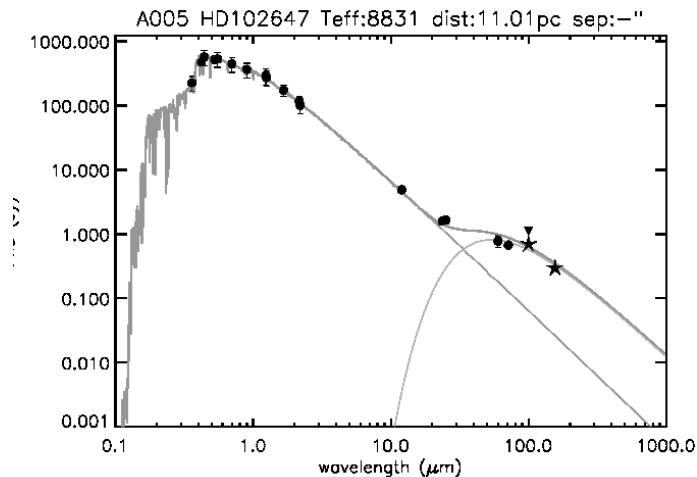


- so far: 7 A,F-type stars with PACS photometry in green and red bands
 - bright (IRAS-discovered) discs
 - faint (Spitzer-discovered) dust excesses
 - structured systems (binaries, large discs...)
- still to get:
 - SPIRE photometry
 - cool stars with PACS



spectral energy distributions

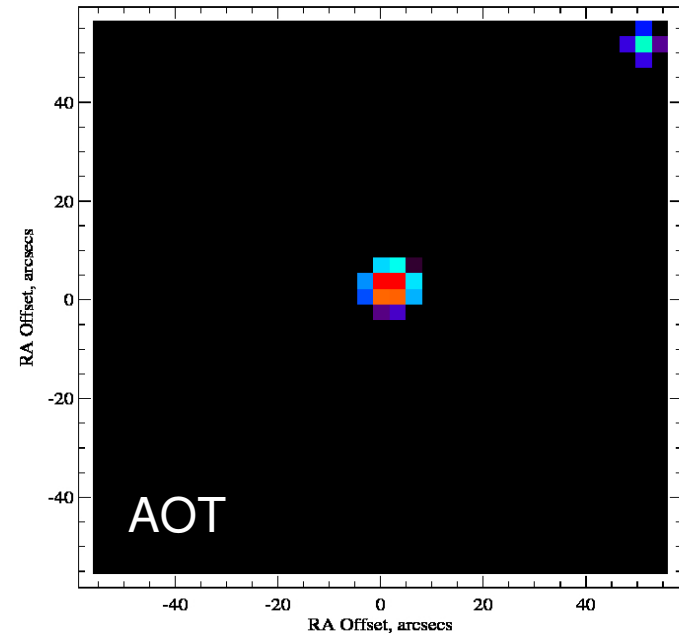
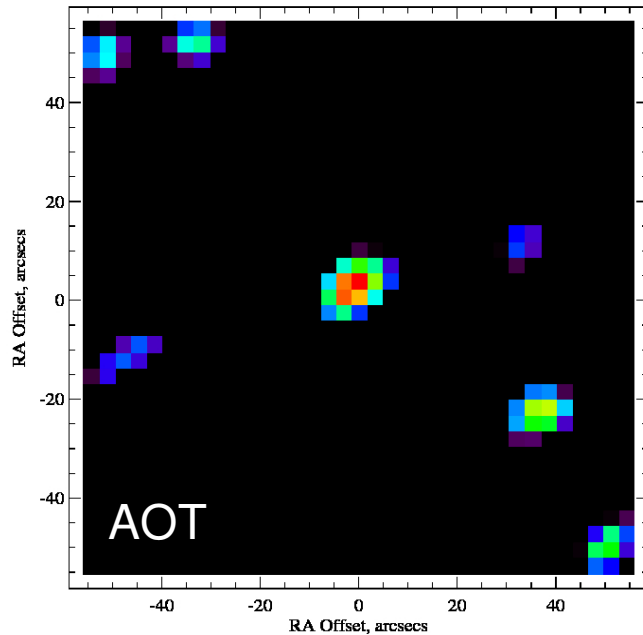
(... preliminary and very conservative photometry, using a 17" radius aperture, big enough for the largest observed disc)





faint dust

- zeta Dor (F012, i.e. 12th closest F-star to Sun)
 - only 70% excess with MIPS/70

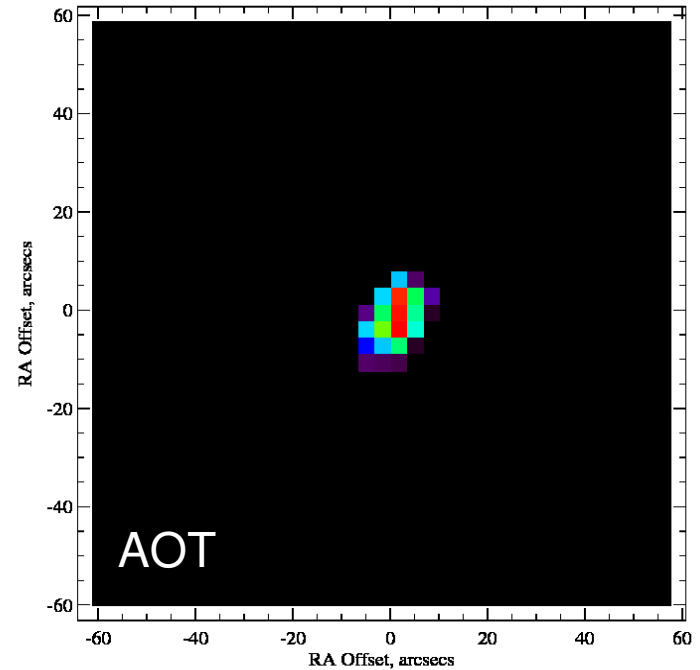
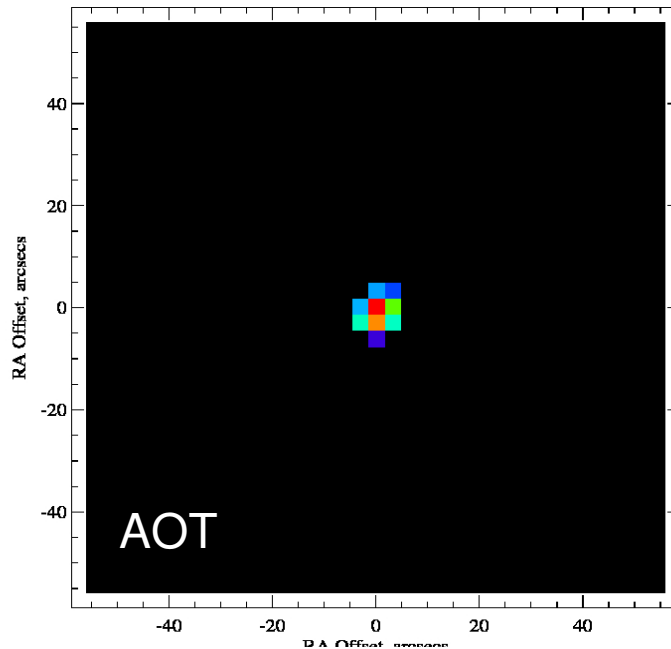


- images are PACS/100 & /160 (left, right), from 2sigma/pixel



compact discs

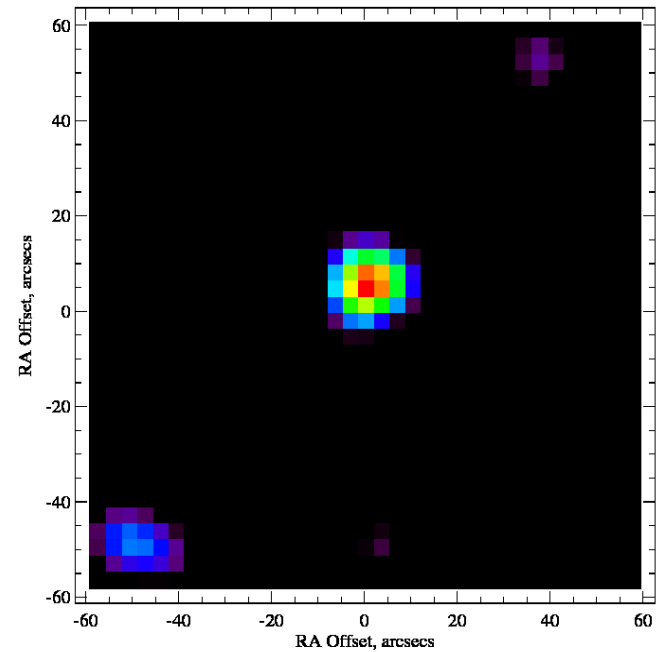
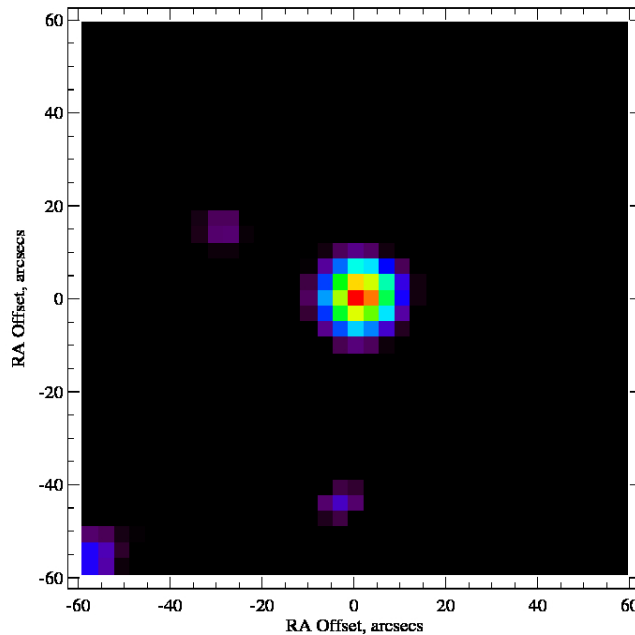
- zeta Tuc (F005)
 - only 40% MIPS/70 excess, now resolved!





bright stars

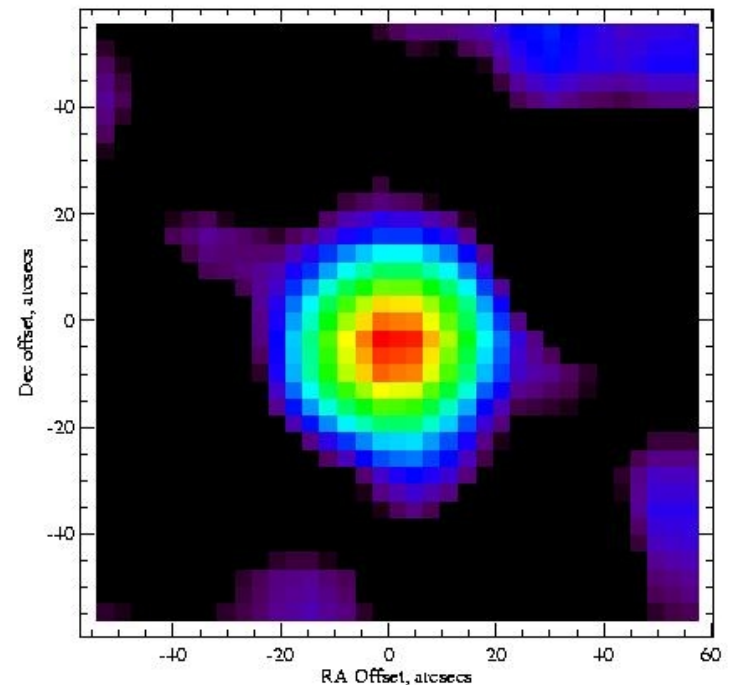
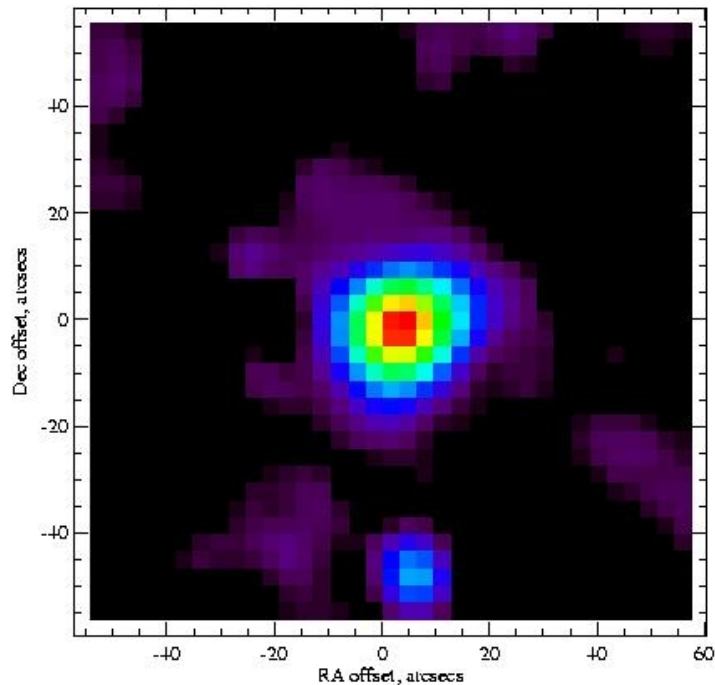
- beta UMa (A024)
 - disc seen around 2nd magnitude star





extended discs

- beta Leo (A005)
 - large disc imaged: radius ~ 200 AU
 - images are star-subtracted*: inner dust too!



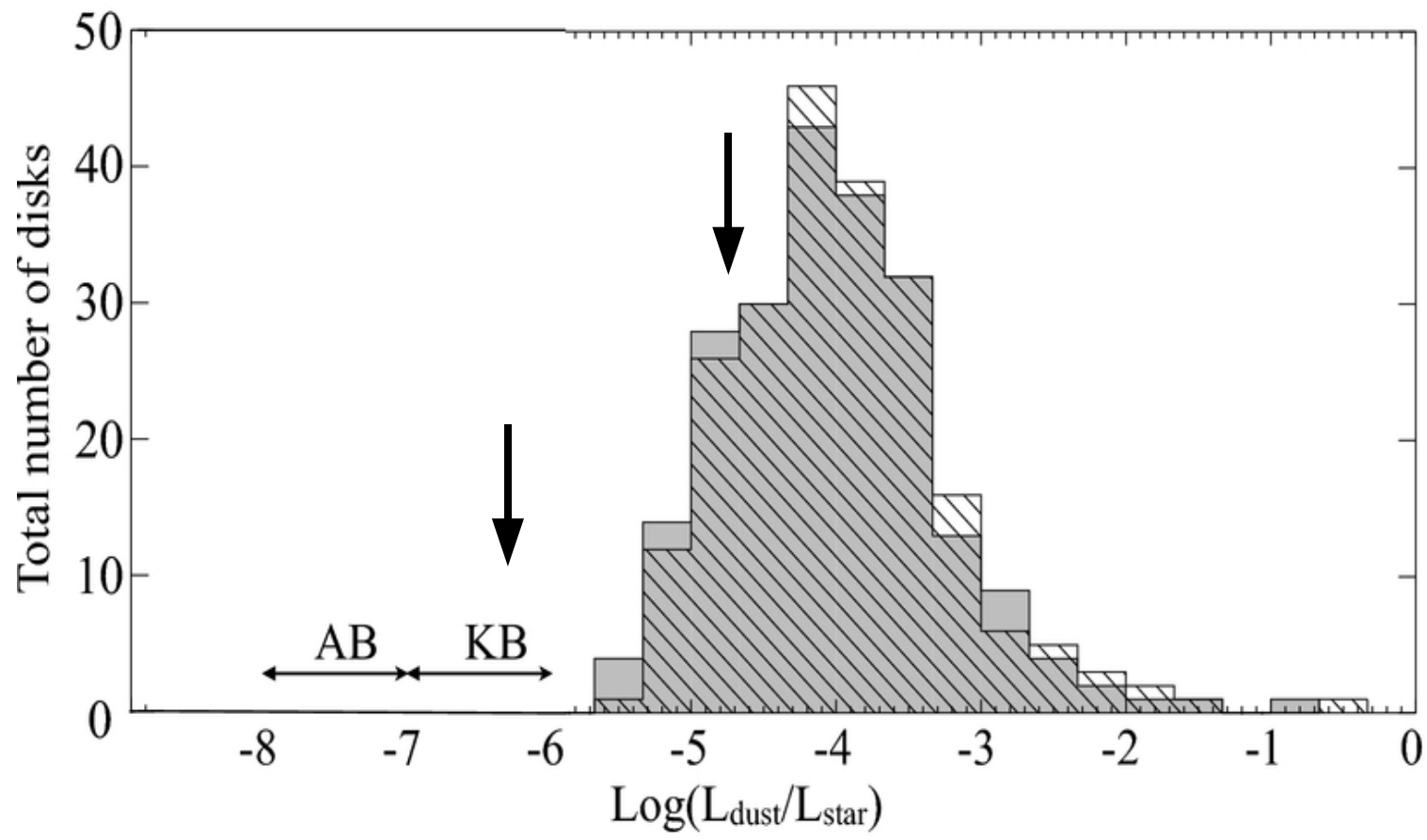
* preliminary



fitted properties

results for these four discs:

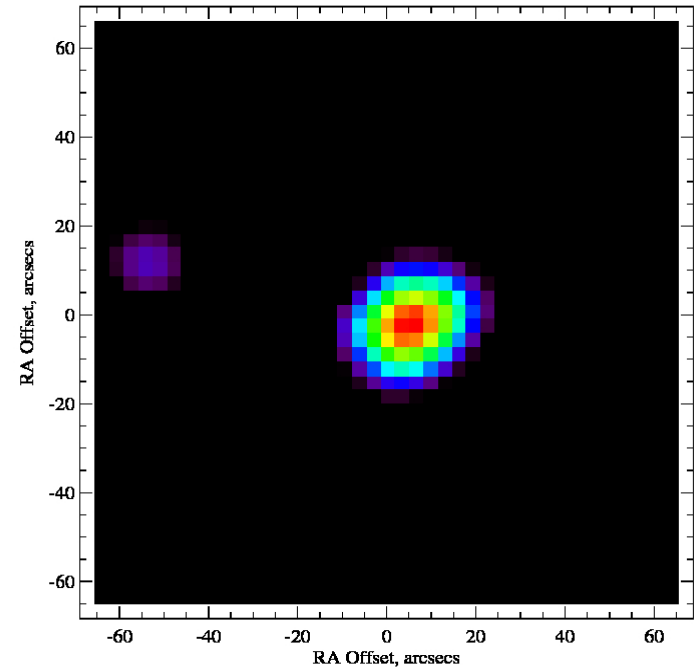
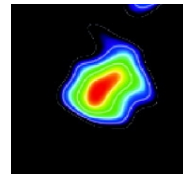
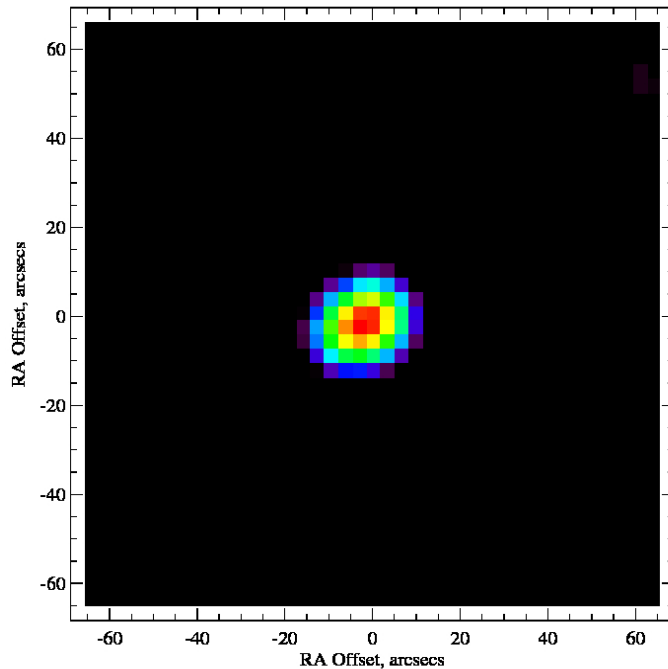
	T_{dust} (K)	$L_{\text{dust}}/L_{\text{star}}$	
zeta Tuc	31	$5 \cdot 10^{-7}$	(~Kuiper Belt!)
zeta Dor	135	$1.6 \cdot 10^{-5}$	
beta UMa	124	$1.7 \cdot 10^{-5}$	
beta Leo	94	$2.2 \cdot 10^{-5}$	





latest data

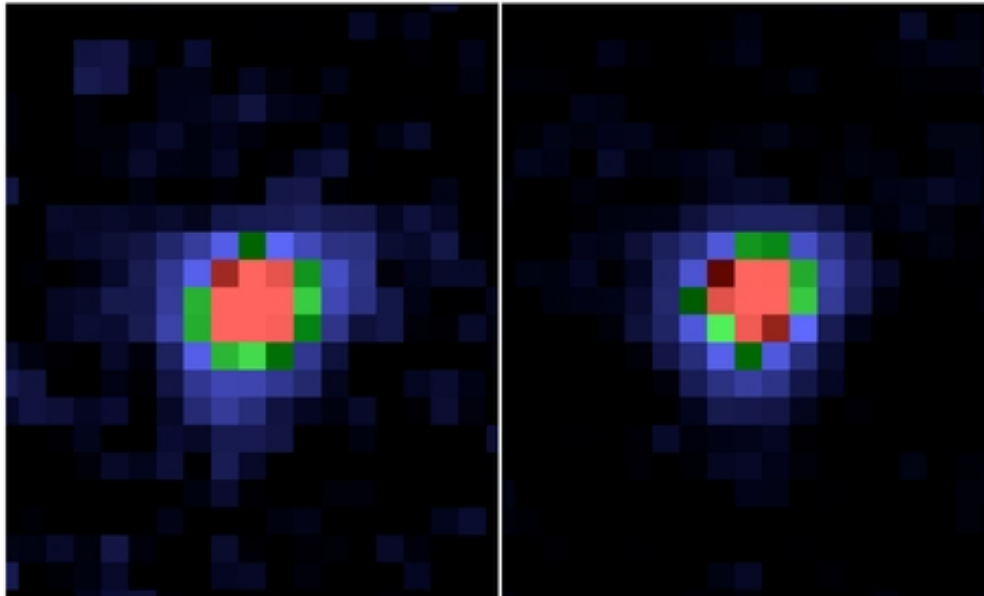
- added in last week, analysis ongoing
 - eta Crv (F063: *below, with inset of SCUBA 450 micron image from 2003*)





latest data

- also working on comparison of photometry and scan with PACS: e.g. beta Leo at 100 microns
 - left = photometry, right = scan (from zero level)
 - very similar fluxes; also at 160 microns





performance

- SDP goals included:
 - (decide on final observing modes)
 - (verify survey depth achievable)
 - recover faint excesses
 - yes
 - image discs of various sizes
 - yes
 - new science, e.g. cold disc population
 - yes!



more to come!!

