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Infrared observations of young massive stars

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Abstract. Infrared observations of young massive stars yield crucial insights on the birth of high-mass stars and their interaction with the parent molecular cloud. Results for IRAS23140+6121, G254.681+0.219, and NGC6334F obtained by near- and mid-infrared imaging are presented for a brief illustration.

Discussion

The formation of high-mass stars ($M \geq 8\,M_\odot$) is still a matter of debate. The validity of the accretion scenario has been questioned since radiation pressure on dust grains might hinder the infall of matter. The coalescence of medium-mass stars was suggested to be an alternative mechanism (Bonnell *et al.* 1998). Due to the large average distances of high-mass stars, ultimate angular resolution, *e.g.*, by adaptive optics (AO), is required for a detailed study of their formation. Their rapid evolution implies that they burn hydrogen while still being deeply embedded in the parent molecular cloud, giving rise to ultracompact HII

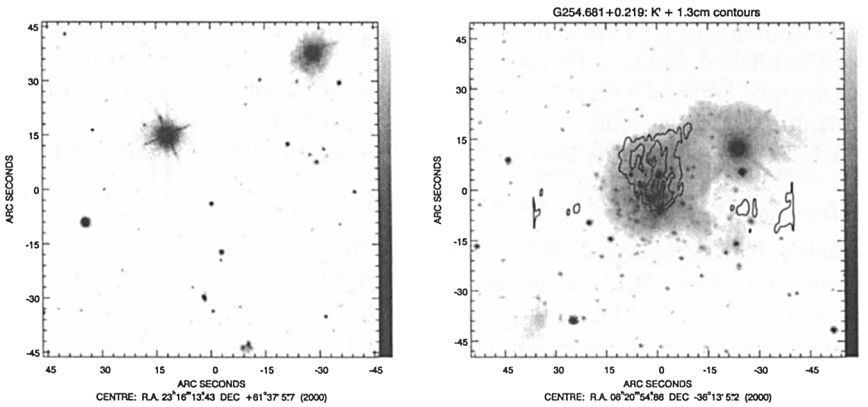

Figure 1. *Left:* AO-image of IRAS 23140+6121 taken with ALFA at 2.1 μm. The wavefront reference star is at the position (+12″,+15″). The UCHII at (−27″,+42″) is marginally resolved. The polarisation of its diffuse emission points to scattering in bipolar cavities. The faint bipolar object at (−6″,−45″) coincides with intense 1.3 mm dust continuum emission (R. Klein, private comm.). *Right:* 2.2 μm image of the UCHII G 254.681+0.219 with contours of the 1.3 cm emission from Kurtz (1995). The dense ionized gas is confined to the embedded star cluster.

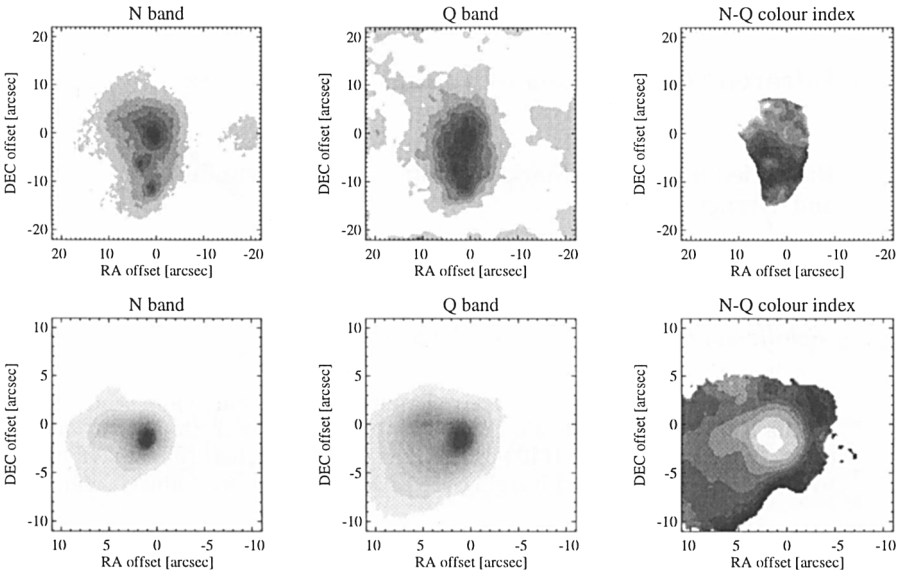

Figure 2. N and Q images of G 254.681+0.219 (*top*) and NGC 6334F (*bottom*) taken with MANIAC (Böker *et al.* 1997). The distribution of the thermal radiation from hot dust is similar to that of the free-free emission. Three heating sources are present in G 254.681+0.219. The right images show the $N-Q$ colour index where areas of low colour temperature appear dark. The deeply embedded outflow-driving source NGC 6334F-IRS2 (Bachiller & Cernicharo 1990) is visible in the Q image at (–3″,2″) and the $N-Q$ map. It was not yet detected at $\lambda \leq 10\,\mu$m (Persi *et al.* 1998).

regions (UCHIIs). The large visual extinction towards such objects precludes their detection at optical wavelengths. We performed high-resolution infrared measurements of UCHIIs and hot molecular cores. Our findings on G 45.45+0.06 were published recently (Feldt *et al.* 1998). Here we briefly present results on three more sources (Figs. 1 & 2)[1]. Together with molecular line and radio continuum observations, these will be used to build consistent source models, which, eventually, might lead to a better understanding of their formation.

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