

THE LOW-MASS STELLAR LUMINOSITY FUNCTION OF THE 30 DOR STARBURST CLUSTER

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Abstract.

Diffraction limited near-infrared H-band ($1.6 \mu\text{m}$) NICMOS HST images are scheduled to be obtained in mid-October 1997 of the young cluster NGC 2070 (age 3.5 Myr) in the 30 Dor giant HII region in the LMC. The aim is to search for the low-mass ($M < 2 M_{\odot}$) low-luminosity, red pre-Main Sequence stellar population and to establish the H-band infrared luminosity function. With the NICMOS we can now determine whether the IMF in this prototypical extragalactic starburst cluster is deficient in subsolar low-mass stars or not. The best ground-based data can sample only $M > 2 M_{\odot}$. In principle, NICMOS in the H-band (F160W) is sensitive enough to reach a magnitude of ~ 23.5 in a relatively short integration time, which indeed corresponds to the fantastic possibility to detect young stellar objects with masses near the hydrogen burning limit ($M=0.1 M_{\odot}$) according to pre-Main Sequence evolutionary models. Even if we could reach only $H = 22.5$ (i.e. $M=0.4 M_{\odot}$), our observations will still go a long way in directly answering, by star counts, whether the IMF in starburst galaxies is low-mass deficient or not, with all the corresponding far-reaching implications.

The observations would also tell us whether the 30 Dor cluster can be regarded as a prototype young globular cluster. This possibility would be ruled out, if we found NGC 2070 to be low-mass deficient, because old globular clusters do have a rich population of low-mass stars.