A DEEP NEAR INFRARED SOUTHERN SKY SURVEY:

A new probe for hidden stellar populations in our Galaxy.

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We are currently implementing the instrumentation and the data analysis tools aimed at performing a deep, complete survey of the Southern Sky (project **DENIS**) in 3 near-IR photometric bands (I=0.9μm, J=1.25 μm, K=2.2μm). The anticipated 3σ limiting magnitudes for point sources in I, J and K are 18, 16 and 14, respectively. The spatial resolutions will be 3" in J and K and 1.5" in I. The survey will be carried out with a dedicated IR camera installed at the ESO 1 m telescope in Chile during 3 years and will start in mid '93. One expects the detection of several 10^7 sources. The final products that we plan to deliver to the community are, so far: a set of "cleaned" elementary images of $12' \times 12'$, a computer accessible data-bank ($\approx$ 3Tbytes) with appropriate software tools and specialized catalogs. One major impact of this survey will be to provide digitized maps, that will facilitate stellar counts and follow-up statistical investigations. Thanks to a better spatial resolution and a much lower sensitivity to cool dust emission, DENIS will be less limited by confusion in crowded regions (galactic plane, bulge, etc...) than was the IRAS [12μm] survey. The moderate interstellar extinction in the near-IR range compared to the optical range ($A_K \sim \frac{A_V}{10}$) will allow probing of stellar populations at low galactic latitudes and in optically obscured regions of our Galaxy. The near-IR range corresponds to the emission peak of frequent species of stars of low surface temperature. Knowledge of the faint end of the luminosity function is necessary for the determination of the contribution of low-mass stars to the missing mass in our Galaxy. The search for brown dwarfs is an especially important challenge. Modeling suggests that a few 10^4 of them could be detected, but the positive identification of even a few of them would be a major discovery. At the other end of the mass distribution, DENIS will detect all red giants out to distances halfway across the Galaxy, it will considerably increase the number of known AGB stars suffering high mass-loss effects and of Young Planetary Nebulae. Many major structural features of our Galaxy will benefit of this survey: stars in the molecular ring at 4 kpc will be detected, the radial and vertical scale lengths of the relevant spectral type stars will be improved. DENIS will provide new knowledge about the luminosity function of the populations of late and young stars and their distribution throughout the Galaxy. The bulge of our Galaxy will be more clearly revealed than in the IRAS survey. Of particular promise are studies of the distribution of late-type stars at large distances from the galactic center. It will be possible to trace aspects of the stellar distribution in the region characterized by the galactic warp and gravitationally dominated by dark matter. Finally the detection of all supergiants, secured by follow-up observations , will lead to new informations on the formation and evolution of massive stars and open clusters.