ISO-SWS SPECTRA OF THE GALACTIC CENTER: IMPLICATIONS FOR OTHER GALAXIES

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We present a 2.4–45 μm spectrum of the center of our Galaxy obtained with the Short Wavelength Spectrometer (SWS) on board ESA's Infrared Space Observatory (*ISO*). The wide range of ionic fine structure lines observed allows to determine the average effective temperature of the ionizing stars to 35 000 K, with a small contribution of significantly hotter stars, consistent with ageing of an active period of massive star formation that took place a few million years ago. Several absorption features from the foreground cold ISM are detected for the first time. The extinction law towards the Galactic center lacks the expected deep minimum in the 4–8 μm range. Since most of the Galactic center extinction arises in the foreground, the extinction law will likely apply to other lines of sight as well. From detection of OH 34.6 μm absorption, we infer that radiative pumping is likely the major excitation mechanism for OH emission from the Galactic center. We discuss the rich spectrum of iron and nickel and conclude that the [Fe II] spectrum is inconsistent with pure collisional excitation. This calls for caution in interpretation of [Fe II] emission in sources, such as starburst galaxies, which contain intense radiation fields. A more detailed account of this work will be given in the issue of Astronomy and Astrophysics presenting first *ISO* results.

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A STUDY OF THE STELLAR POPULATIONS IN NEARBY STARBURSTS

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Near-IR spectroscopy combined with high spatial resolution imaging have been used in this work to probe the central 1′ of M82 and Arp 299. Narrowband imaging observations in the 2.36 μm CO bandhead and the 3.29 μm dust feature and Fabry-Perot imaging observations in the near-IR hydrogen recombination-lines are combined with near-IR broadband imaging to study the nature of the starburst stellar population. In M82, our high spatial resolution recombination-line data have allowed us to obtain the most accurate extinction-corrected colors and luminosities to date toward the starburst region. Twelve different point-like sources, assumed to be stellar clusters, are identified in the extinction-corrected K-band image. A stellar population synthesis model is constructed and compared with observations. Our analysis implies that the typical burst age for these clusters is 10^7 years. In addition, our high spatial resolution observations indicate that there is an age dispersion within the starburst complex that is correlated with projected radius from the center of the galaxy. The inferred age dispersion is 6×10^6 years. If the starburst in M82 is propagating outwards from the center, this age dispersion corresponds to a characteristic velocity of propagation, originating in the center, of about 50 km s^{-1}. Our quantitative analysis also reveals that a truncated IMF is not necessary to explain the integrated properties from the central $\simeq$ 500 pc. In Arp 299, we find that the H recombination line, the 3.29 μm dust feature, and the near-infrared broadband emission is concentrated at the position of the three active regions, known as sources A, B, and C. The extinction-corrected ratio of the 3.29 μm dust feature luminosity to the total far-infrared luminosity in each of these sources is found to be consistent with that found in M82. This similarity, and the fact that we see no evidence for broad recombination lines, suggests that the putative AGN in source A does not dominate the properties of this source. When compared with starburst models, our observations suggest that the starburst age in sources A, B, and C is similar to that found in the M82 starburst complex. The starburst in source B appears to be older than that in source A and source C is the youngest starburst region. Source A appears to have a smaller upper mass cutoff than source B, which explains the larger ratio of far-infrared luminosity to ionizing photon flux observed from this source.

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