AH could be a dominant heating mechanism for the class I filaments, and also for the less luminous class II filaments. Even if AH cannot be invoked as the sole mechanism powering the optical line emission of class II filaments, it could be, however, an important ingredient to explain the emission coming from low ionization lines in these systems. The models with nonlinear heating and high AH efficiencies exhibit a strong [O I]λ6300 emission, and, therefore, AH could be an additional component together with other mechanisms for producing most of the emission in Hα and higher ionization lines (as [N II]λ6583).

[1] Departamento de Astronomia, IAG/USP, São Paulo, Brazil.
[2] Departamento de Física Teórica e Experimental, CCE/UFRN, Rio Grande do Norte, Brazil.

STAR FORMATION IN NUMERICAL SIMULATIONS

Jeroen Gerritsen[1] and Vincent Icke[2]

Star formation is governed by the delicate interplay between stars and the interstellar medium (ISM). Stars influence the ISM by heating it, by means of far-ultraviolet (FUV) and ionizing radiation, stellar winds, and supernovae, while the ISM, in return, provides the necessary material to form stars. We study large scale star formation by means of the hybrid N-body/smoothed particle hydrodynamics code TREESPH (Hernquist & Katz 1989). Crucial for the process of star formation are the cooling properties of the gas. We assign a standard cooling function (Dalgarno & McCray 1972), with ionization fraction $x = 0.1$ to the gas. Gas temperatures between 10 K and 10^6 K are allowed. Gas may form stars if the local Jeans mass is smaller than the mass of a 'small' Giant Molecular Cloud (10^5 $M_\odot$). In practice this condition selects cold ($T < 100$ K) gas. A star actually forms as soon as an SPH particle is unstable longer than the local free-fall time. As feedback on the ISM, we include so far only the FUV radiation, which heats the gas by photoelectric emission from dust and small grains. This FUV radiation is calculated for each star assuming an IMF and evolves in time according to standard stellar evolution. In the 3D simulations of isolated galaxies (Gerritsen & Icke 1996) we find that the star formation regulates itself to an approximately constant star formation rate (about 1 $M_\odot$/yr for the Galaxy), and it establishes a two-phase ISM. In general we find:

a) Cold gas ($T < 100$ K) only in the plane of a galaxy,

b) new stars in the plane of the galaxy,

c) a Schmidt law dependence of the star formation rate on the gas density (SFR $\propto \rho^{1.3}$), and

d) flocculent spiral structure.

Dalgarno, A., & McCray, R. 1972, ARA&A, 10, 375
Gerritsen, J. P. E., & Icke, V. 1996, A&A, submitted
Hernquist, L., & Katz, N. 1989, ApJS, 70, 419

[1] Kapteyn Astronomical Institute, Groningen, The Netherlands.
[2] Leiden Observatory, Leiden, The Netherlands.

DIAGNOSTICS OF *ISO*-SWS SPECTRA OF STARBURST AND ULTRALUMINOUS GALAXIES

D. Kunze[1], D. Rigopoulou[1], and D. Lutz[1]

We present models with our interpretation of mid and far-IR fine structure and H_2 lines observed with *ISO*-SWS in Starburst and Ultraluminous Galaxies, and the Galactic Center (see Rigopoulou et al.; Lutz et al. this volume). We used the photoionization code CLOUDY (Ferland 1993) to determine the dependence of the observed line ratios on the properties of the ionizing continuum. Using EUV input flux distributions from stellar model atmospheres and parameters for the conditions derived from observations, we created diagnostic plots, allowing a direct determination of the single star equivalent effective temperature from measured line ratios. The ionizing fluxes from LTE (Kurucz 1994) and NonLTE models (with radiative-driven wind theory and a consistent treatment of the NonLTE line blocking opacities; Sellmaier et al. 1996) lead to results which differ up to several 1000 K in T_{eff} for given line ratios. As single star spectra do not properly describe the ionizing radiation field of the variety of OB stars in starbursts, we synthesised combined spectra by adding up the contributions of individual stars weighted according to an $\alpha = -2.4$ Salpeter initial mass function. With CLOUDY we derived the dependence of the line ratios on the upper mass cutoff of the distribution. Because the combined radiation field is softer than the spectra of the most massive stars in the mixture, a higher upper mass cutoff results than in the single star approach. The H_2 rotational lines, for the first time accessable with *ISO*, are a powerful tool to constrain the properties of the warm ISM in starbursts. The dependence of line fluxes and ratios on density and temperature were derived from excitation model calculations. Additionally, the rotational lines allow a direct determination of the excitation temperature and the mass content of the weakly excited levels of H_2.

Ferland, G. J. 1993, Int. Rep., Univ. of Kentucky
Kurucz, R. L. 1994, CD-ROM No. 19
Sellmaier, F. H., et al., 1996, A&A, 305, L37

[1] Max-Planck-Institut für extraterrestrische Physik, D-85740, Garching, Germany.