Chemical Evolution of Bulges

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1. The Multiphase Model applied to Bulges

We present the multiphase model applied to a set of bulges. This model was first applied to the Solar Neighborhood, and then to the Galactic Disk, by computing the radial dependence of input parameters, which govern the gas accumulation in the disk, and the cloud and star formation processes. These processes result enhanced in the central region due to the volume effect. The evolution of the Galactic bulge was thus directly obtained (Mollá & Ferrini, 1995), with the same set of efficiencies and characteristic collapse time scale defined for the disk. We have also applied the model to a sample of spiral disks, by changing the input parameters according their total masses and Hubble types. With the same approach used for our Bulge, we now extend the model to their bulges (Mollá et al., 2000)

The resulting SFR in the central regions shows a intense initial episode in the first Gyr. Surface densities for atomic and molecular gas of later type bulges are higher than those of earlier types. The predicted Galactic bulge mean metallicity, $\overline{[\mathrm{Fe/H}]} = -0.17$, and the corresponding metallicity distribution, are in excellent agreement with data. Mean stellar abundances are subsolar for all modelled bulges ($\mathrm{T} \geq 3$), independently of the Hubble type, the arm class and/or the luminosity of their host galaxies, reproducing the estimations from color data. The ratio between past and present SFR and the abundance [Mg/Fe] are correlated with the Hubble type: they decrease for late type bulges. The predicted spectral indices Mg_2 and $Fe52$, computed by evolutionary synthesis models, are also similar to those observed.

References

Mollá, M. & Ferrini, F. 1995 Evolution of Spiral Galaxies.V. The Galactic Bulge. *ApJ*, 454, 726.

Mollá, M., Ferrini, F. & Gozzi, G. 2000 Bulges. *MNRAS*, 316, 345