METALLICITY GRADIENTS IN THE DISKS OF S0 GALAXIES[1]

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The gaseous component in disks of spiral galaxies generally shows strong metallicity gradients of about 0.2 dex per scale length of the disk (e.g. Edmunds and Pagel 1984, MNRAS 211,507). Current models explain these gradients by a radially varying ratio of stellar density to gas density, possibly coupled with infall of gas from outside and radial gas flows in the disk (Lacey and Fall 1985, Ap.J. 290,154). It follows from these models that the final metallicity gradient (i.e. the gradient after infall has ceased and all gas has been locked into stars) should be quite shallow.
Observationally the question of the final metallicity gradient in disks can be accessed best via the investigation of disks in S0 galaxies. Although it is still a matter of debate whether S0's are just spirals in which the gas supply has run out several Gyrs ago or whether S0 galaxies are fundamentally different from spirals (e.g. with respect to D/B ratios), the metallicity gradients observed in the stellar disks of S0's may indicate the strength of the final metallicity gradients in the disks of spirals. For this purpose we derived radial Mg_2-profiles for a sample of S0 galaxies. Assuming that the mean age in the disks does not vary radially we can roughly relate Mg_2 to [Fe/H] following Terlevich et al. (1981, MNRAS 196,214) by [Fe/H] = 3.9 Mg_2 - 0.9. From our data (see figure) we obtain a mean metallicity gradient in the disks of S0's of only 0.03 $\pm$0.03 dex in [Fe/H] per scale length. This average gradient is about a factor 6 weaker than the metallicity gradients measured in HII region analysis for the gaseous disks of spiral galaxies.

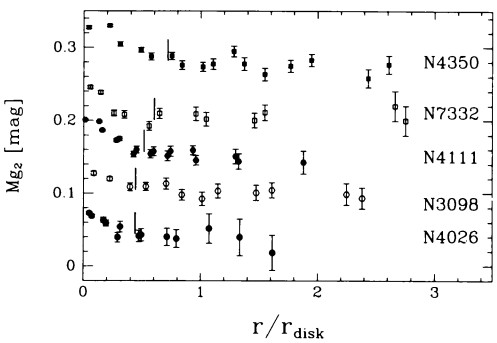

Figure:
Mg_2-index as a function of radius (normalized to the scale length of the disk r_D).The Mg_2-indices of the following galaxies have been shifted: NGC 4111 by -0.05, NGC 3098 by -0.11 and NGC 4026 by -0.2 [mag].The vertical bar indicates the radius inside which the bulge dominates the light.

[1] Based on observations obtained at the German-Spanish Astronomical Center, Calar Alto, operated by the Max-Planck-Insitut für Astronomie, Heidelberg, jointly with the Spanish National Commission for Astronomy.