S0 GALAXY LINE STRENGTHS AND GRADIENTS

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Line strengths and their gradients in Mg, Fe, and Hβ have been determined for a sample of 20 S0 galaxies in order to study the stellar populations of their bulges and disks and to investigate their relationship to elliptical galaxies. The data were obtained with the Lick Observatory 3m telescope in the long-slit mode over the region 4215−5615 Å with resolution 3.1 Å.

We infer bulge and disk gradients for the 9 most edge-on galaxies for which we have both major and minor axes profiles. The major and minor axes gradients in the bulge dominated inner regions are similar. At larger radii the disk profiles flatten considerably while the bulge Mg_2 strengths continue declining to lower values. Converted to [Fe/H] the bulges reach central values ∼1-3 times solar and generally fall to [Fe/H] values lower than solar in our last measured points (>1 r_e). In contrast to the steep bulge Mg_2 gradients, the disk profiles are quite shallow. Based on our Mg_2 profiles, the average metal gradient found in the disks of our subsample is Δ [Fe/H] / Δ $(r/h) = -0.06 \pm 0.05$, corresponding to a reduction in the mean metallicity of the disk stellar population by <15% per disk scale length (h).

Our findings do not support formation scenarios in which bulges formed either from heated disk material at late times after disk formation or through dissipationless stellar merging, as neither process includes mechanisms for producing the observed metallicity gradients. Our observations are better explained in terms of formation via dissipative collapse (or merging) at early-times.

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