

# Breaks in surface brightness profiles and radial abundance gradients in the discs of spiral galaxies

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## Abstract

© ESO, 2017. We examine the relation between breaks in the surface brightness profiles and radial abundance gradients within the optical radius in the discs of 134 spiral galaxies from the CALIFA survey. The distribution of the radial abundance (in logarithmic scale) in each galaxy was fitted by simple and broken linear relations. The surface brightness profile was fitted assuming pure and broken exponents for the disc. We find that the maximum absolute difference between the abundances in a disc given by broken and pure linear relations is less than 0.05 dex in the majority of our galaxies and exceeds the scatter in abundances for 26 out of 134 galaxies considered. The scatter in abundances around the broken linear relation is close (within a few percent) to that around the pure linear relation. The breaks in the surface brightness profiles are more prominent. The scatter around the broken exponent in a number of galaxies is lower by a factor of two or more than that around the pure exponent. The shapes of the abundance gradients and surface brightness profiles within the optical radius in a galaxy may be different. A pure exponential surface brightness profile may be accompanied by a broken abundance gradient and vice versa. There is no correlation between the break radii of the abundance gradients and surface brightness profiles. Thus, a break in the surface brightness profile does not need to be accompanied by a break in the abundance gradient.

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## Keywords

Galaxies: abundances, Galaxies: spiral, Galaxies: structure, ISM: abundances

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