

R24a Abundance diagnosis of E+A (post-starburst) galaxies

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E+A galaxies are characterized as galaxies with strong Balmer absorption lines but without any [OII] or H δ emission lines. The existence of strong Balmer absorption lines means that E+A galaxies have experienced a starburst within the last <1 Gyr. However, the lack of [OII] or H δ emission lines indicates that E+A galaxies do not have any ongoing star formation. Therefore, E+A galaxies are interpreted as post-starburst galaxies. However, there remain other possibilities, such as the dusty starburst scenario, where E+A galaxies have ongoing star formation, but optical emission lines are invisible as a result of heavy obscuration by dust. Therefore, additional evidence of the post-starburst phenomenon has been eagerly awaited.

Using one of the largest samples of 451 E+A galaxies carefully selected from the Sloan Digital Sky Survey Data Release 4, here we show the abundance diagnosis of E+A galaxies using Mg and Fe lines. Our findings are as follows. (i) E+A galaxies have an enhanced α -element abundance ratio compared to star-forming galaxies with similar Balmer absorption strength. Because the truncation of strong starburst is required to enhance the α -element ratio, this is additional evidence that E+A galaxies are in the post-starburst phase. (ii) The metallicity and α -element abundance of E+A galaxies are consistent with those of elliptical galaxies, suggesting that E+A galaxies could be one of the progenitors of present-day elliptical galaxies in terms of chemical abundances.

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