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Galaxy Zoo: Dust lane early-type galaxies are tracers of recent, gas-rich minor mergers

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We present the second of two papers concerning the origin and evolution of local early-type galaxies exhibiting dust features. We use optical and radio data to examine the nature of AGN activity in these objects, and compare these with a carefully constructed control sample.
We find that dust lane early-type galaxies are much more likely to host emission-line AGN than the control sample galaxies. Moreover, there is a strong correlation between radio and emission-line AGN activity in dust lane early-types, but not the control sample. Dust lane early-type galaxies show the same distribution of AGN properties in rich and poor environments, suggesting a similar triggering mechanism. By contrast, this is not the case for early-types with no dust features. These findings strongly suggest that dust lane early-type galaxies are starburst systems formed in gas-rich mergers. Further evidence in support of this scenario is provided by enhanced star formation and black hole accretion rates in these objects. Dust lane early-types therefore represent an evolutionary stage between starbursting and quiescent galaxies. In these objects, the AGN has already been triggered but has not as yet completely destroyed the gas reservoir required for star formation.

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