Hot DQ White Dwarf Stars: A New Challenge to Stellar Evolution

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Canonical stellar evolution predicts that the majority of white dwarfs have a core made of carbon and oxygen which itself is surrounded by a helium layer and also, for $\sim$ 80 % of known white dwarfs, by an additional hydrogen layer. Thus, all white dwarfs have been traditionally found to belong to one of these two categories: those with a hydrogen rich atmosphere (the DAs) and those with a helium rich atmosphere (the non-DAs). Here we report the discovery of several white dwarfs with an atmosphere primarily composed of carbon, with little or no trace of hydrogen or helium. Our analysis shows that the atmospheric parameters found for these stars do not fit satisfactorily in any of the currently known theories of post-asymptotic giant branch (AGB) evolution, although these objects might be the cooler counter-part of the unique and extensively studied PG 1159 star H1504+65. These stars, together with H1504+65, might thus form, a new evolutionary post-AGB sequence.