Using polluted white dwarfs to understand exoplanetary material

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Observations of planetary material *polluting* the atmospheres of ~ 30 percent of white dwarfs provide a unique means to probe the bulk composition of exoplanetary material. Although more than 1000 polluted white dwarfs are known, a small sub-sample have enough species present to investigate the correlation between siderophilic species (e.g. Fe, Ni and Cr) compared to lithophilic species (e.g. Ca, Mg and Si) such that exoplanetary composition and geology can be probed. In order to reach the numbers required for population statistics, more heavily polluted white dwarfs must be discovered and characterised. *Gaia* provides unprecedented access to a large number of newly identified white dwarfs. The most heavily polluted white dwarfs tend to be those which host observable circumstellar dust discs. We present the first results from a large ground based spectroscopic survey which targets newly discovered *Gaia* white dwarfs with dust discs inferred from *WISE* and *Spitzer* infrared excesses. Our high signal-to-noise spectra reveal a plethora of absorption lines for multiple species for each target. Analysing the abundances of the planetary material that polluted these white dwarfs reveals they have accreted material with a large range of volatile content, including two systems that appear to be accreting water-rich bodies. There is also evidence for the accretion of fragments of a core-mantle differentiated body, showing core-mantle differentiation and disruptive collisions are commonplace in exoplanetary systems. In order to obtain *absolute* metal abundances of the pollutant, precise and accurate stellar parameters are required. However, we show instead how elemental ratios are less influenced by imprecise knowledge of stellar parameters and that the conclusions regarding exo-composition and exo-geology are little affected.