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Artifical intelligence applied to the automated analysis of absorption spectra.

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A new and fully-automated method is presented for the analysis of high-resolution absorption spectra (GVP-FIT). The method has broad application but here we apply it specifically to the problem of measuring the fine structure constant at high redshift. For this we need objectivity and reproducibility. Three numerical methods are unified into one "artificial intelligence" process: a genetic algorithm that emulates the Darwinian processes of reproduction, mutation and selection, non-linear least-squares with parameter constraints (VP-FIT), and Bayesian model averaging. In this talk we illustrate the method using a test-case, the $z_{abs} = 1.8389$ absorber towards the $z_{em} = 2.145$ quasar J110325-264515.

Summary

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