Single-valued integrals and modular forms

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Abstract: Single-valued period integrals are certain combinations of period integrals (à la Kontsevich-Zagier) which can be regarded as the Archimedean analogues of p-adic periods; their theory was only recently systematised by Brown and Dupont. Many of the transcendental quantities of interest in algebraic and analytic number theory admit a single-valued integral representation. I will illustrate this phenomenon, and discuss applications, in two situations connected to the theory of modular forms: the first concerning Fourier coefficients of weakly holomorphic Poincaré series, and the second, in joint work with Francis Brown, concerning values of higher Green's functions.