A COMPLETION OF A GENERATING SERIES OF
DUKE-IMAMOGLU-TOTH

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I report on joint work in progress with K. Bringmann and M. Schwagenscheidt. We construct a real analytic modular form \( \Omega(\tau, z) \) of weights 3/2 and 2 which can be considered as a modular “completion” of a generating series considered by Duke-Imamoglu-Toth of the weakly holomorphic modular forms \( g_{n,2} \) of weight 3/2, related to the traces of singular moduli of the \( j \)-function. Computing the Fourier expansion in \( z \) shows that this function also happens to be a generating series of modular forms of weight 2, whose Fourier coefficients also are traces of certain CM-values. We also show that \( \Omega \) satisfies a differential equation with respect to the Laplace operator in \( \tau \) and \( z \) and maps to well-known non-holomorphic theta functions for a quadratic space of signature \( (1, 2) \) under the lowering operators in \( \tau \) and \( z \) (namely, the Kudla-Millson theta function in \( z \) and a Siegel theta function in \( \tau \)).