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## Higher Order Spectral Shift Functions

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**Abstract.** In estimates for the remainder of a Taylor-type approximation of the value of a function  $f$  at a self-adjoint operator  $H_0 + V$  by Frechet derivatives of  $f$  at a self-adjoint operator  $H_0$ , it is generally hard to separate contribution of a scalar function  $f$  from contribution of the perturbation  $V$ . It is known that under certain assumptions on  $f$  and  $V$ , a trace of the remainder of the approximation by the zero order or by the zero and first order derivatives is a bounded linear functional on the space of  $f'$  or  $f''$ , respectively. The measure representing this functional is absolutely continuous, with the density equal to Krein's or Koplienko's spectral shift function, respectively. In joint work with K. Dykema, we construct spectral shift functions for higher order Taylor remainders in both the traditional and von Neumann algebra settings of the perturbation theory. A natural (as will be explained) restriction on the perturbation in the traditional setting is that  $V$  be in the Hilbert–Schmidt class.