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A Bochner–Pearson type class

This talk is about the operator $L_\mu[f] = \int_{\mathbb{R}} \frac{f(x)-f(y)}{x-y}\, d\mu(y)$ (here μ is a measure), or more precisely about the related Sturm–Liouville-type operator $Q_\mu = p(x) L_\mu^2 + q(x) L_\mu$. I will describe when such an operator has polynomial eigenfunctions; for the SL operators, the corresponding class is the Bochner–Pearson class. The operator has *orthogonal* polynomial eigenfunctions only if μ is a semicircular distribution. More generally, the operator $p(x) L_\mu L_\nu + q(x) L_\mu$ has orthogonal polynomial eigenfunctions only if μ is a Jacobi shift of ν.