Title: On the subtleties of a 1D regularized interpolation problem

Abstract. I will consider functionals of the form $F(u) = \int_I |u'|dx + \int_I |u-f|^2 d\mu$ where $I = (0,1)$, f is a given (decent) function and μ is a given measure. F is well defined in $W^{1,1}$ but need not admit a minimizer there. On the other hand F is not well defined on the natural larger space BV, especially when the measure μ is singular, e.g. a sum of Dirac masses— a case already of great interest. I will present various ways of "forcing" F to have minimizers and I will discuss the properties of the corresponding minimizers.