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On sums of two squares in function fields

The starting point of this talk is Landau's theorem: The number of sums of two squares up to x is about $K x/\sqrt{\log x}$, where $K>0$ is the Landau-Ramanujan constant. We will discuss the function field analogue of Landau's theorem, and will report on recent developments on function field versions of some classical open problems in this theory.