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For a variety of general type over a number field, the Bombieri-Lang conjecture predicts that the rational points are not dense. For a surface of general type, this means that all but finitely many rational points lie on curves of genus 0 and 1. Hence, it is of Diophantine interest to be able to find the genus 0 and 1 curves on a surface. A global section of the sheaf of differentials, or a symmetric power thereof, gives significant information on such curves.

We discuss some techniques for computing such differentials and present some examples where these can be used to determine all genus 0 and 1 curves on the surface. This talk is based on [Nils Bruin, Jordan Thomas and Anthony Várilly-Alvarado, Explicit computation of symmetric differentials and its application to quasihyperbolicity, Algebra and Number Theory 16-6, 2022] and includes some interesting updates stemming from joint work with Nathan Ilten and Zhe Xu.