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Curves on irregular surfaces and Brill-Noether theory

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The irregularity of a smooth complex projective surface is the number q of independent global 1-forms of S ; there exist a complex torus of dimension q , the Albanese variety $\text{Alb}(S)$, and a map $S \rightarrow \text{Alb}(S)$, the Albanese map, through which any map $S \rightarrow T$, T a complex torus, factorizes. The Albanese dimension of a surface is the dimension of the image of the Albanese map.

Little is known on surfaces of general type with Albanese dimension 2. I will propose an approach to the study of these surfaces via the analysis of the curves of small genus on them. This leads naturally to considering the Brill-Noether locus $W(C)$ of a curve C of S , namely the set of line bundles P in $\text{Pic}^0(S)$ such that the divisor $C+P$ is effective. I will give a structure result for $W(C)$ and show that it gives numerical restrictions on the curves of small genus on S . This is joint work with Margarida Mendes Lopes and Gian Pietro Pirola.

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