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Curves on irregular surfaces and Brill-Nother theory

ZEIT:
20.6.2011, 16:00 Uhr - 17:00 Uhr

ORT:
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SR 119

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 Alb(S), and a map S-->Alb(S), the Albanese map, through which any map S-->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 Pic0(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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