



CENTRO DE  
**MATEMÁTICA**  
UNIVERSIDADE DO PORTO

GEOMETRY AND TOPOLOGY SEMINAR

# A tower of surfaces near the Bogomolov–Miyaoka–Yau line

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**Abstract.** For complex smooth algebraic surfaces of general type the Bogomolov–Miyaoka–Yau inequality  $K^2 \leq 9\chi$  holds. Surfaces on the line  $K^2 = 9\chi$  are ball quotients and have infinite fundamental group, and it is natural to ask how close one can get to this line using simply connected surfaces.

In this talk, I will explain how computer experiments with the fundamental group of a ball quotient surface, the Cartwright–Steger surface, led us to a geometric construction of an infinite tower of surfaces on the line  $K^2 = 9\chi - 18$ , which is parallel and asymptotically close to the Bogomolov–Miyaoka–Yau line.

The experiments revealed a recurring pattern of index–3 subgroups, suggesting the existence of successive  $\mathbb{Z}/3$ -covers. Guided by this observation, we construct a sequence of surfaces using triple covers branched on suitable configurations of singularities. We show that the first few surfaces are simply connected and conclude with a conjecture that this holds for the entire tower.

THURSDAY, FEBRUARY 05

10H30

Room: 1.08



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