On Chern slopes of simply connected surfaces in any characteristic

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Abstract:
This talk will be about geography of Chern slopes of minimal simply connected surfaces of general type over arbitrary algebraically closed fields. In the case of characteristic zero, it will be about spin and nonspin simply connected surfaces of positive index (work in collaboration with X. Roulleau). In that case, we prove that in both cases Chern slopes are dense in the allowed interval [2,3]. In characteristic $p>0$, it will be about minimal étale simply connected surfaces of general type (work in collaboration with R. Codorniu). In this case, we prove density in [2, infinity [for each p, and so Bogomolov-Miyaoka-Yau inequality is violated everywhere. We conjecture that for these examples the Picard scheme is a reduced point. This conjecture is closely related to having a Kawamata-Viehweg vanishing theorem for rational surfaces.