

# SASAKIAN STRUCTURES ON SMALE-BARDEN MANIFOLDS

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ABSTRACT. Sasakian geometry is an important odd-dimensional counterpart of Kähler geometry. This topic is of great interest for researchers in the fields of differential geometry, algebraic geometry and topology. The seminal book of Boyer and Galicki pointed out several important directions of research and still unsolved problems related to manifolds endowed with K-contact or Sasakian structure. These are the problems of existence and the research program of studying topological properties of such manifolds. In my talk, I will present recent results in this framework in the first difficult case of 5-dimensional simply connected manifolds. These results are obtained together with Vicente Muñoz and Matthias Schütt. We systematically develop the theory of quasi-regular Seifert fibrations over orbifolds which are not necessarily smooth and apply it to solve several existence problems. For example, we find all Smale-Barden manifolds admitting null Sasakian structures, and solve several existence problems posed by Boyer and Galicki.

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