Oberseminar Topologie: 30.11.2020

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„Manifolds with odd Euler characteristic and higher orientability“

Abstract:
Orientable manifolds have even Euler characteristic unless the dimension is a multiple of 4. I give a generalisation of this theorem: k-orientable manifolds have even Euler characteristic (and in fact vanishing top Wu class), unless their dimension is 2^{k+1}m for some integer m. Here we call a manifold k-orientable if the i^{th} Stiefel-Whitney class vanishes for all 0<i< 2^k. This theorem is strict for k=0,1,2,3, but whether there exist 4-orientable manifolds with an odd Euler characteristic is a new open question. Such manifolds would have dimensions that are a multiple of 32. I discuss manifolds of dimension high powers of 2 and present the results of calculations on the cohomology of the second Rosenfeld plane, a special 64-dimensional manifold with odd Euler characteristic.