

Bier Complexes

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We introduce and study *Alexander r -tuples* $\mathcal{K} = \langle K_i \rangle_{i=1}^r$ of simplicial complexes, as a common generalization of pairs of Alexander dual complexes (Alexander 2-tuples) and r -unavoidable complexes of Blagojević, Frick, and Ziegler. In the same vein, the *Bier complexes*, defined as the deleted joins \mathcal{K}_Δ^* of Alexander r -tuples, include both standard *Bier spheres* and the so called *optimal multiple chessboard complexes* (introduced by Jojić, Vrećica, and Živaljević) as interesting, special cases.

Our main results are: (1) the r -fold deleted join of Alexander r -tuple is a pure complex homotopy equivalent to a wedge of spheres, and (2) the r -fold deleted join of a collectively unavoidable r -tuple is $(n - r - 1)$ -connected.

This research is a joint work with Gaiane Panina, Duško Jojić, and Ilya Nekrasov.
