Bern-Fribourg Graduate Seminar

a seminar for Master and PhD students

Thursday 11th December, 2025: 17:00 - 17:30

Room B6, Exakte Wissenschaften, Bern

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Factorization of Split Orthogonal Matrices into Elementary Factors

Abstract

Over a field, the factorization of invertible matrices of determinant 1 into a product of elementary matrices is a classical theme in linear algebra. In modern language, this is the familiar statement that elements of SL_n can be generated by elementary transformations, a fact that underlies Gaussian elimination and many basic structural results about matrix groups.

The picture changes when we impose additional constraints. If we restrict attention to a structured subclass of determinant-1 matrices and require each elementary factor to remain inside that same subclass, the factorization problem becomes markedly more delicate. In certain settings such a constrained decomposition still holds, while in others it fails due to genuine algebraic obstructions.

In this talk, I focus on this constrained factorization problem for split orthogonal matrices of size $2n \times 2n$. I will discuss the extent to which such matrices admit decompositions into products of appropriate orthogonal elementary matrices, and I will present criteria, examples, and obstructions that clarify when this factorization is possible and when it is not.