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Holonomy of special connections on Lorentzian manifolds

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Abstract: At the beginning I will recall the theory of holonomy groups of the Levi-Civita connections on Riemannian and Lorentzian manifolds. Then I will explain recent results on the holonomy of metric connections with torsion. In particular, I will discuss the classification problem for naturally reductive homogeneous spaces. If the time allows, I will also discuss recent results about holonomy and related problems for Weyl connections in Lorentzian signature.

References:

1. A.S. Galaev, Holonomy groups of Lorentzian manifolds. *Math. Surv.* 70 (2015), no. 2, 249–298.
2. R. Cleyton, A. Moroianu, U. Semmelmann, Metric connections with parallel skew-symmetric torsion. *Adv. Math.* 378 (2021) 107519.
3. A.S. Galaev, I. Ernst, On Lorentzian connections with parallel skew torsion. *Documenta Math.* 27 (2022), 2333--2383.
4. A. Dikarev, A.S. Galaev, Parallel spinors on Lorentzian Weyl spaces. *Monatshefte für Math.* 196 (2021), 39--58.

