The gauge-gravity duality

Two mathematical structures dominate our description of nature. One is gauge fields, or fiber bundles involving Lie Groups. The second is Riemannian geometry. We use the first to describe particle physics and the second to describe gravity.

While these two mathematical structures are very different, the quantum theories based on them are connected. We describe this connection and we will point out some of the mathematical structures that arise in such studies. Certain Riemannian geometries can give solutions to problems in quantum gauge theories.