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Non-singular stationary spacetimes with negative cosmological constant

We construct a wide variety of stationary spacetimes with negative cosmological constant. These include families of solutions with various matter fields (including Maxwell, Yang-Mills, dilaton,...), black hole solutions, and boson stars. The solutions are parameterized by freely prescribable functions specifying the asymptotics of the metric and possible matter fields at conformal infinity. The construction uses an implicit function argument around "non-degenerate" vacuum solutions (defined by requiring an operator associated with the linearization of the equations to be an isomorphism). As the Anti-de Sitter and Schwarzschild AdS spacetimes fulfill this condition, we obtain infinite dimensional families of solutions close to these, including a family of solutions with the usual AdS conformal structure at conformal infinity.

This is joint work with Piotr Chrusciel and Erwann Delay.