Construction of gravitational instantons of type ALG* and ALH*

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From the 70's physicists and mathematicians are interested in the Yang-Mills analogue for gravity. These gravitational instantons were constructed using various methods and have recently been classified. These spaces do not only show up in physics, but they have also been realized as the bubbles of degenerating Calabi-Yau metrics on the K3 surfaces.

In this talk, we explore a gluing construction of gravitational instantons of type ALG* and ALH*. Compared to the other types of gravitational instantons these spaces have a non-standard geometry, and we explain the consequence this has on the functional analysis. Due to the explicit nature of this construction, we will see how the metric bubbles of Atiyah-Hitchin and Taub-NUT spaces as the metric degenerates to a flat 3-manifold.