Loop quantum gravity (LQG) is one of the major subjects in the research of quantum gravity. Recent study suggests that in three-dimensional LQG a non-vanishing cosmological constant ($\Lambda \neq 0$) can arise from a deformed phase space which is, under suitable closer constraints, reduced to glued hyperbolic triangles or hyperbolic discrete geometries [1]. This article explores this direction of research to four-dimensional cases. To be specific, the authors consider hyperbolic tetrahedra in the context of LQG with $\Lambda \neq 0$, then investigate in detail closer constraints for this particular geometry. In conclusion the authors find two types of the constraints and show that both of these lead to a unique hyperbolic tetrahedron up to global translations on the 3-hyperboloid. The results are expected to be useful for further studies of LQG with $\Lambda \neq 0$ in four dimensional spacetime.

References

[1] V. Bonzom, M. Dupuis, F. Girelli and E. R. Livine, arXiv:1402.2323 [gr-qc].