# MP 1: Gravity: Classical and Quantum

Time: Monday 12:00–13:20 Location: H-HS VII

MP 1.1 Mon 12:00 H-HS VII

**Disformal transformations in Weitzenböck geometry** — •Manuel Hohmann — University of Tartu, Tartu, Estonia

We study disformal transformations in the context of scalar extensions to teleparallel gravity, in which the gravitational interaction is mediated by the torsion of a flat, metric compatible connection. This geometry, also known as Weitzenböck geometry, provides an alternative background geometry also for other field theories. We find a generic class of scalar-torsion actions which is invariant under disformal transformations, and which possesses different invariant subclasses. For the most simple of these subclasses we explicitly derive all terms that may appear in the action. We propose to study actions from this class as possible teleparallel analogues of healthy beyond Horndeski theories, or degenerate higher-order scalar tensor (DHOST) theories.

MP 1.2 Mon 12:20 H-HS VII

**Riding on a Dark Bubble: Emergent de Sitter cosmology** — •Souvik Banerjee[1], Ulf Danielsson[2], and Suvendu Giri[2] — [1]Julius-Maximilians-University Würzburg, Würzburg, Germany — [2]Uppsala University, Uppsala, Sweden

I will discuss how dark energy can be realised using unstable AdS, with our universe riding an expanding bubble. Our proposal involves realising four dimensional effective gravity on a brane which mediates the decay from a non-supersymmetric five dimensional Anti deSitter false vacuum to a true vacuum. In this way, it is natural for a four dimensional observer to experience an effective positive cosmological constant coupled to matter and radiation, avoiding the need for scale separation or a fundamental de Sitter vacuum. I will in particular discuss the holographic interpretation with matter induced in this model by hanging strings. I will argue how our construction provides a new way to understand the cosmological horizon, and also the underlying deep implications for particle physics and black holes.

MP 1.3 Mon 12:40 H-HS VII

**Wormholes in $AdS_4$** — •Joshua Kames-King[1] and Souvik Banerjee[2] — [1]Bethe Center for Theoretical Physics Bonn — [2]Julius-Maximilians-Universität Würzburg

We construct a traversable wormhole in four-dimensional Anti-de-Sitter space via the Maldacena-Milekhin-Popov construction. We show that in contrast to asymptotically flat space the solution acquires thermodynamic stability and represents the energetically most viable solution. Furthermore we construct a quantum field theory on this background and calculate the spectrum in differing limits.

MP 1.4 Mon 13:00 H-HS VII

**Space - Time - Matter: Finite Projective Geometry as a Quantum World with Elementary Particles** — •Klaus Mecke — Institut für Theoretische Physik, Universität Erlangen-Nürnberg

A unified theory for space-time and matter might be based on finite projective geometries instead of differentiable manifolds and fields. Each point of the world is equipped with a quadratic form over a finite Galois field which define neighbors in the finite set of points. Due to the projective equivalence of all quadratic forms this world is necessarily a 4-dimensional, locally Lorentz-covariant space-time with a gauge symmetry G(3)xG(2)xG(1) for internal points which represent elementary particle degrees of freedom. Thus, matter appears as a geometric distortion of an inhomogeneous field of quadrics and all physical properties (spins, charges) of the standard model seem to follow from its finite geometric structure in a continuum limit. The finiteness inevitably induces a fermionic quantization of all matter fields and a bosonic for gauge fields. The main difference to Einstein's general theory of relativity is the use of finite fields instead of real numbers to parametrize points of events.

K. Mecke, Biquadrics configure finite projective geometry into a quantum spacetime, EPL 120, 10007 (2017).