



universität  
wien

Fakultät für Mathematik

Antrittsvorlesung  
**Mathematisches Kolloquium**

**Mittwoch, 13. November 2024**  
**Sky Lounge**

**EINLADUNG**

**Aristotelis Panagiotopoulos**  
(University of Vienna)

**„Incompleteness Theorems for Observables in  
General Relativity“**

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**Abstract:**

*'Formulating a theory of quantum gravity is one of the biggest open problems in mathematical physics. Some of the core technical and epistemological difficulties come from the fact that General Relativity (GR) is 'generally covariant', i.e. invariant under change of coordinates by the arbitrary diffeomorphism of the ambient manifold. The Problem of Observables is a famous instance of the difficulties that general covariance brings into quantization: no non-trivial diffeomorphism-invariant quantity has ever been reported on the collection of all spacetimes. It turns out that there is a good reason for this. In this talk, I will present my recent joint work with Marios Christodoulou and George Sparling, where we employ methods from Descriptive Set Theory in order to show that, even in the space of all vacuum solutions, no complete observables for full GR can be Borel definable. That is, the problem of observables is to 'analysis' what the Delian problem is to 'straightedge and compass'.*

**14.45 Uhr: Kaffeejause**

**15.15 Uhr: Vortrag**

**Kleines Buffet im Anschluss**

Radu Ioan Boț