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A new approach to observables in quantum gravity

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Physics in (canonical) quantum gravity needs to be manifestly diffeomorphism-invariant. Consequently, physical observables need to be formulated in terms of manifestly diffeomorphism-invariant operators, which are necessarily composite. This makes an evaluation in general involved, even if the concrete implementation of quantum gravity should be treatable (semi-)perturbatively in general.

A similar problem exists also in flat-space gauge theories, even at arbitrarily weak coupling. In such cases a mechanism developed by Fröhlich, Morchio and Strocchi turns out to be highly successful in giving analytical access to the bound state properties. As will be shown, the conditions under which it can be applied are also satisfied by many quantum gravity theories. Its application will be illustrated by applying it to a canonical quantum gravity theory to determine the leading properties of curvature excitations and particles with and without spin.

In-person participation

Yes

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