

QM MASTERCLASS:

Geometric Variational Problems

Diversity and Common Patterns with a Special Emphasis on General Relativity

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At the University of Southern Denmark

Masterclass by:



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Geometric variational problems (shortest paths, minimal surfaces, harmonic maps, Yang-Mills fields, Chern-Simons functional, ...) have a long history going back to the Euler-Lagrange equation of the Calculus of Variations. They pose mathematical challenges and are also essential tools to provide key field equations in Mechanics and Physics. The setting of bundles and connections, finally formalised in the mid 20th century, provides the appropriate context to deal with these problems in a systematic way, establishing curvature as a central object to be taken into consideration. The interaction of these problems with theoretical physics has grown substantially in the second part of the 20th century because of the very successful trend to develop a geometric approach to a number of theories through a variety of Lagrangians. It is quite remarkable that this trend was introduced for the first time in the theory of General Relativity, making this theory an example especially worthy of special consideration in the context of this set of lectures.

This led to the idea that, to complement this somewhat comprehensive panorama of variational problems, a good way to get useful illustrations of the power of these geometric approaches was to look in some depth at the theory of General Relativity and some other models of gravity.

See details and how to register on sdu.dk/qm-masterclass-gvp