



**UNIVERSITÀ  
DI TRENTO**  
Dipartimento di  
Matematica

# DOTTORATO



CYCLE 35th  
ORAL DEFENCE OF THE PHD THESIS

**Monday 31 July 2023 – at 9.30 am**

Department of Mathematics  
Seminar Room 1

The event will take place in presence and online through the ZOOM platform.  
To get the access codes please contact the secretary office

## Andrea Moro

PhD Student in Mathematics

### Functional formalism for algebraic classical and quantum field theory

**Abstract:**

In the first part of this thesis we study the generalization of the recent algebraic approach to classical field theory by proposing a more general setting based on the manifold of smooth sections of a non-trivial fiber bundle. Central is the notion of observables/functionals over such sections, i.e. appropriate smooth functions on them. The kinematic will be further specified by means of Peierls brackets, which in turn are defined via the causal propagators of linearized field equations. In the second part we implement deformation quantization of the algebras obtained above in the simpler setting of scalar field theory. Wick powers and time ordered products for quantum field theories in curved spacetimes are defined by giving a set of axioms which, when implemented, defines uniquely, up to some classifiable ambiguities, the aforementioned quantities. Those ambiguities are known to be tightly restrained by locality, covariance and other regularity conditions. One of the additional constraints used was to require continuous and analytic dependence on the metric and coupling parameters. It was recently shown that this rather strong requirement could be weakened, in the case of Wick powers, to the so-called parametrized microlocal spectrum condition. We therefore show the existence of Wick powers satisfying the above condition and extend this axiom to time ordered products, while reestablishing the usual uniqueness and existence results in light of the new constraint.

**Supervisor:** Romeo Brunetti

**CONTATTI**

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