abstract:
Frankly speaking, I do not yet know why I was invited to this workshop because my central works so far are usually classified as those in algebraic language theory (= a subfield of the theory of computation) and number theory; but that said, as already well-recognized in some recent literatures, it is also true that some concepts from the theory of computation (say, computational complexity) and number theory (say, modular forms) can shed some new light on analysis of physical models.
In view of this, in this occasion, I would like to try to share my recent works on interplays between algebraic language theory, galois theory, and class field theory with the community of mathematical physics.

Technically speaking, my works concern a unification of algebraic language theory and galois theory, which sheds a new light on classical class field theory. Algebraic language theory, on the one hand, concerns a systematic classification of regular languages (i.e. sets of finite words accepted by finite automata), finite monoids, and finite automata; this theory has been developed since the 1960s in the theory of computation (or formal language theory). As shown in this talk, algebraic language theory can be regarded as a monoid-extension of galois theory in a certain precise (categorical) sense; and more importantly, this unification of the two classical theories from different contexts sheds new lights on classical class field theory and theory of complex multiplication.

In view of that some (mathematical) physicists are concerned with (a variant of) Langlands program (today's well-recognized approach to non-abelian class field theory) in relation to its physical analogue, I hope that this talk could be informative to some of the participants.