



Contribution ID: 8

Type: **Oral presentation**

Fundamental issues on applications of atomic magnetometry

In this talk, I will give an overall introduction on our recent progresses on the applications of high sensitivity atomic magnetometry in this field of biomagnetism, magnetic-field standard, and searches for exotics physics. For biomagnetism, I will introduce the basic idea of measuring the bio-magnetic field signals with atomic magnetometers in unshielded environment, as well as the significance and potential applications of measuring magnetic field signals from different organs of the human being. For magnetic-field standard, I will introduce our recent work on the active magnetic field stabilization with atomic magnetometers, including the basic principle of generating a magnetic field with both high precision and low noise level. For probing the frontiers of the fundamental physics, I will introduce several kinds of novel design and adaptation of the atomic magnetometry, all of which are focused on suppressing the different kinds of systematic errors in the searches for exotic physics beyond the standard model.

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Session Classification: OPM Applications II