

Application for a:	Outgoing Scheme NEWFELPRO Fellowship for experienced researcher
Proposal Acronym:	FemtoBias
Proposal Title:	Femtosecond collective response of density waves and superconductors under external bias
Research area(s):	Physics PHY
Research sub-disciplines:	Condensed Matter Physics: Electronic properties of materials and transport
Category of research:	basic
Duration in months:	36
Keywords:	femtosecond pump-probe spectroscopy, charge density waves, superconductivity, nonequilibrium, collective mode coupling, phase slip dynamics, vortex motion, order parameter
Abstract:	<p>Charge density wave (CDW) and superconductors (SC) are collective ground states emerging from interplay between electron and phonon degrees of freedom. Coupling strengths, ultrafast processes and order parameter dynamics can be investigated by ultrafast time-resolved spectroscopies. In FemtoBias project we propose a novel approach to study ultrafast dynamics of CDWs and SCs, driven out-of equilibrium by applying external bias. External current will break the inversion symmetry of CDW state and induce the coupling between Raman active (amplitude) and infrared active (phase) collective modes. Such coupling has not been studied thus far. SCs will be exposed to external currents to study: i) the influence of vortex motion on the order parameter dynamics by time resolved THz spectroscopy and ii) the dynamics of phase dislocation lines using time resolved magneto-optic imaging. Special attention will be dedicated to the noise reduction through innovative experimental procedures.</p>
Does this proposal possess any of the sensitive ethical issues detailed in ethical issues table?	No