

Title : Ultrafast dynamics of electrons in quantum materials

First Name : Luca

Name : Perfetti

Laboratory : LSI

Email : luca.perfetti@polytechnique.edu

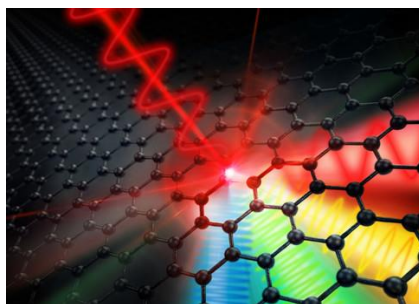
Webpage : <https://portail.polytechnique.edu/lisi/en/research/new-electronic-states>

Research Area : Condensed Matter, Quantum Science and Technology, Material Science

Methods: Ultrafast optics, photoelectron spectroscopy, THz Spectroscopy

PhD track subject:

The student will be focus on the ultrafast carrier's dynamics of hot electrons in heterostructures made of transition metal dichalgonenides, hybrid perovskites and superconducting compounds. He will explore systems showing fascinating physical phenomena and offering specific functionalities. Some examples are: 1) the photoinduced insulator to metal transition driven by the coherent motion of a charge density waves 2) the conversion from spin to charge current at the interface of ferromagnets with superconductors and, 3) the formation of dark excitonic states in hybrid perovskites with low dimensionality.



Ultrafast pulse generating excited electronic waves in a quantum material

“Ultrafast dynamics of hot carriers in a quasi–two-dimensional electron gas on InSe”, Z. Chen *et al.* Proceedings of the National Academy of Sciences **117**, 21962 (2020).

“Band gap renormalization, carrier multiplication, and Stark broadening in photoexcited black phosphorus”, Z. Chen *et al.* Nano letters **19**, 488 (2018).

Full publication's list at:

https://scholar.google.com/citations?hl=fr&user=OLkAVHQAAAAJ&view_op=list_works&sortby=pubdate