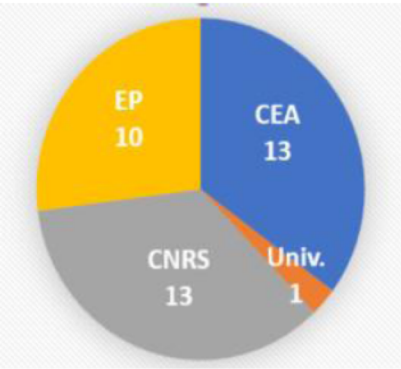
Laboratoire des Solides Irradiés (LSI)

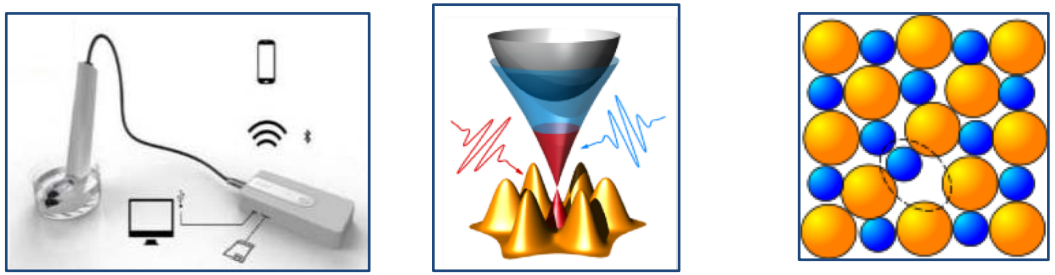
Study of the fundamental properties of the solid state and its interactions with radiation (photons, electrons, ions)

People: 37+20



Competence: Physics+Chemistry
Theory (1/3) + Experiment (2/3)

3 axes



NAME
GDR Nanomaterials for Energy Applications
ELABORATION
MEASUREMENTS & METROLOGY
SIMULATIONS & THEORY
APPLICATIONS

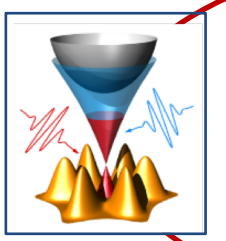
Speaker: Jelena Sjakste

ÉCOLE POLYTECHNIQUE
IP PARIS
cea
cnrs

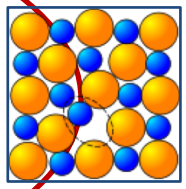
Laboratoire des Solides Irradiés: research axes

Nano Materials and innovative devices

Electronic, photonic, and phononic excitations

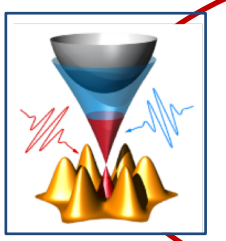


Defects, desorder, and the structure of matter



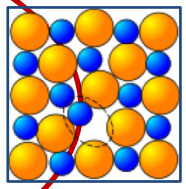
Laboratoire des Solides Irradiés: research axes

Nano-fabrication of innovative devices+ valorisation (sensors, piezo, nanomg)

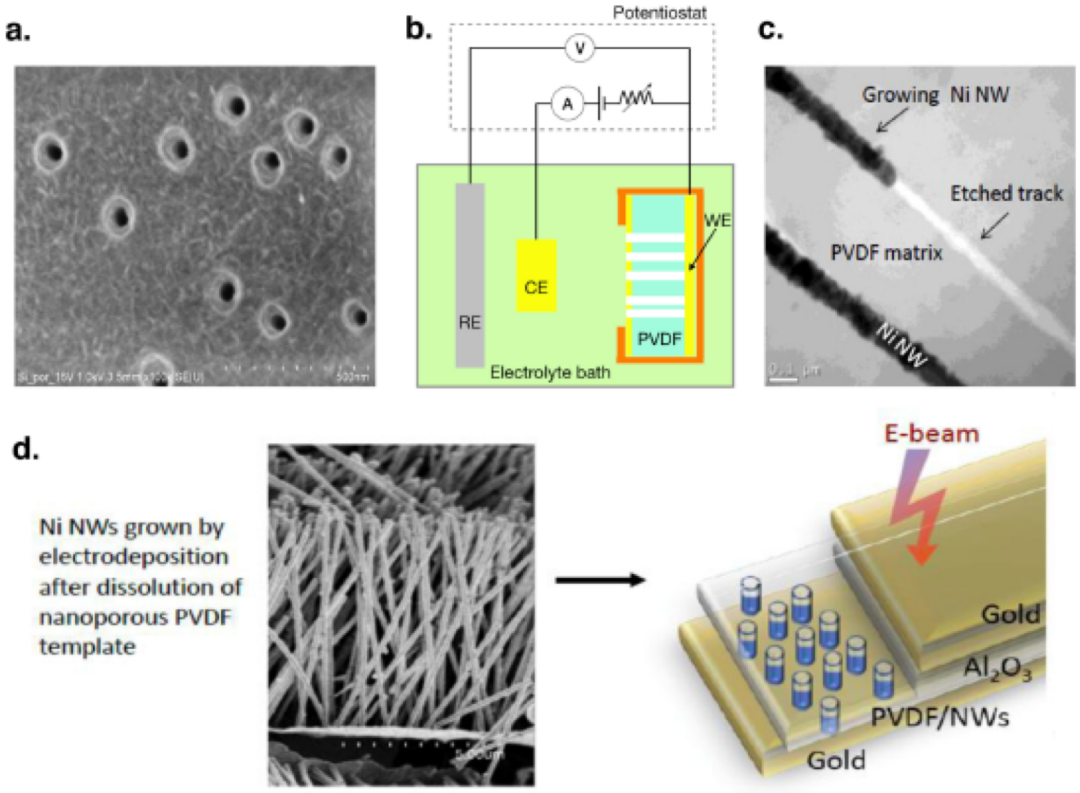


Electronic, photonic, and phononic excitations

Defects, desorder, and the structure of matter



Laboratoire des Solides Irradiés: research axes + GDR Name



Mixing **nanostructured Ni/piezoPVDF composite thin films** with e-beam irradiation: A beneficial synergy to **piezoelectric** response

Potrzebowska et al, Materialstoday comm, 28, 102528 (2021)

Laboratoire des Solides Irradiés: research axes

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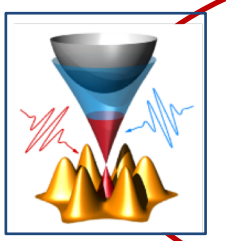

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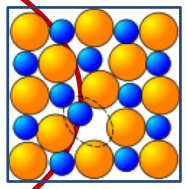
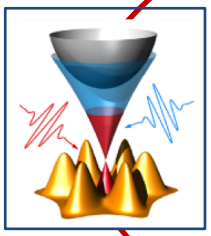


Laboratoire des Solides Irradiés: research axes

Nano Materials and innovative devices

Exp: time-resolved spectroscopy (ARPES,THz)
Theory: theoretical spectroscopy, phonons, electron-phonon, relaxation dynamics, transport



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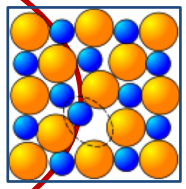
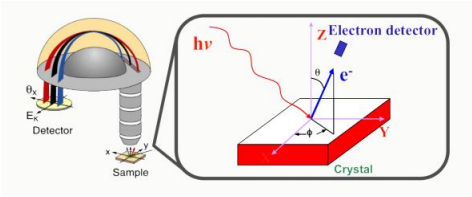
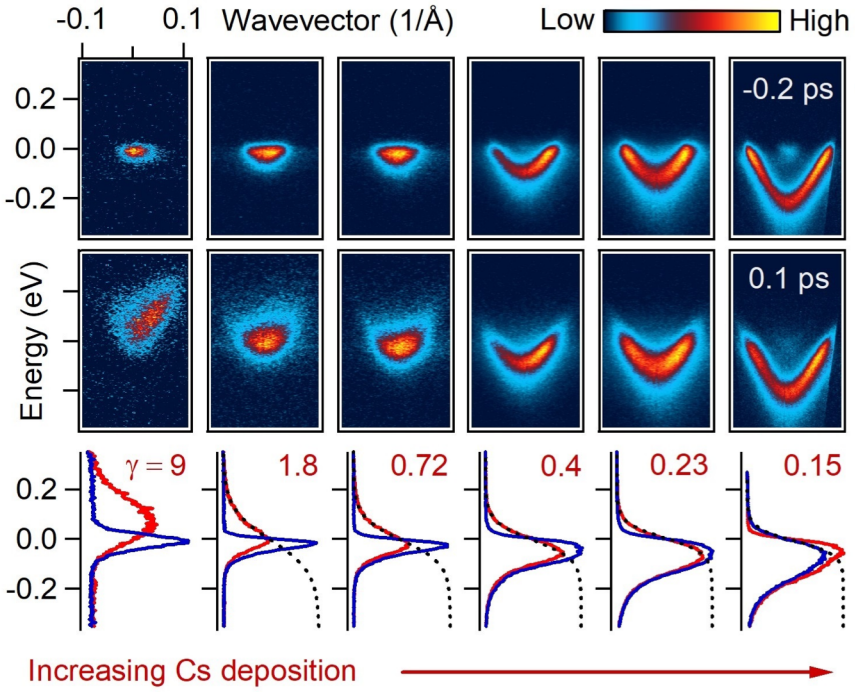
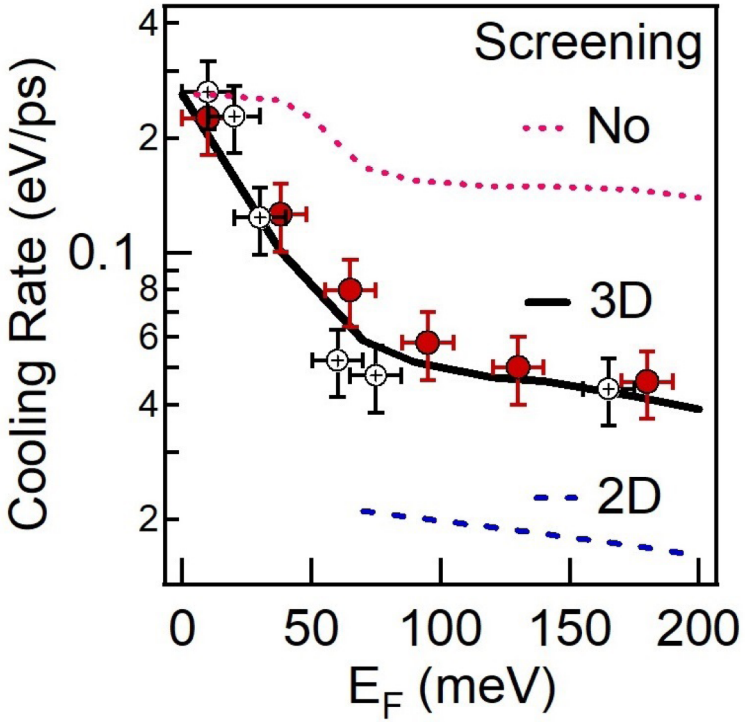


Laboratoire des Solides Irradiés: research axes + GDR Name

Electron-phonon coupling and relaxation dynamics:
2PPE experiment + DFT calculations





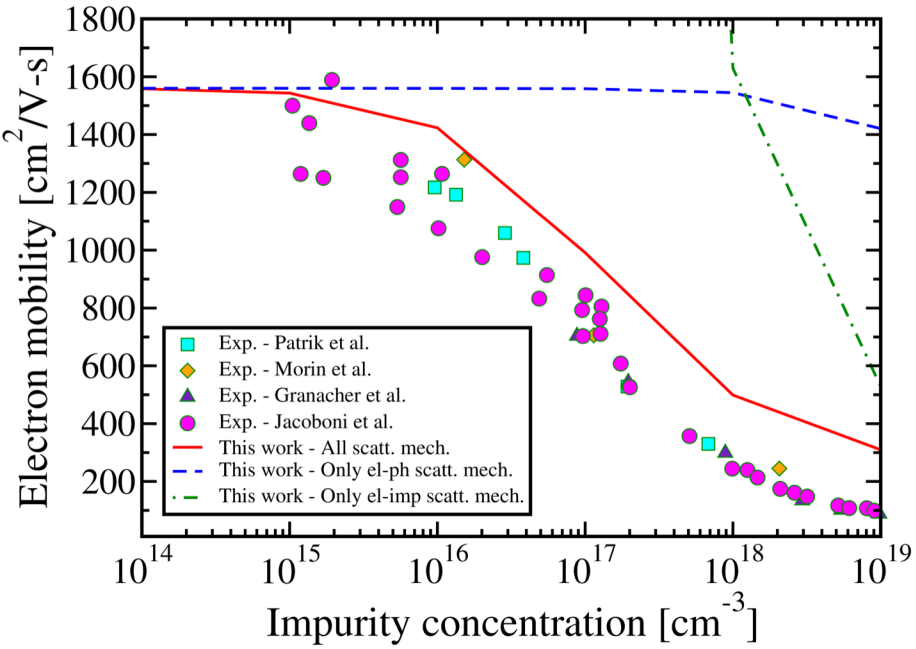


Increasing Cs deposition on InSe surface

Chen, Sjakste et al, PNAS 117, 21962-21967 (2020)

Laboratoire des Solides Irradiés: research axes + GDR Name

Electron-phonon coupling and transport properties (theory)



QUANTUMESPRESSO

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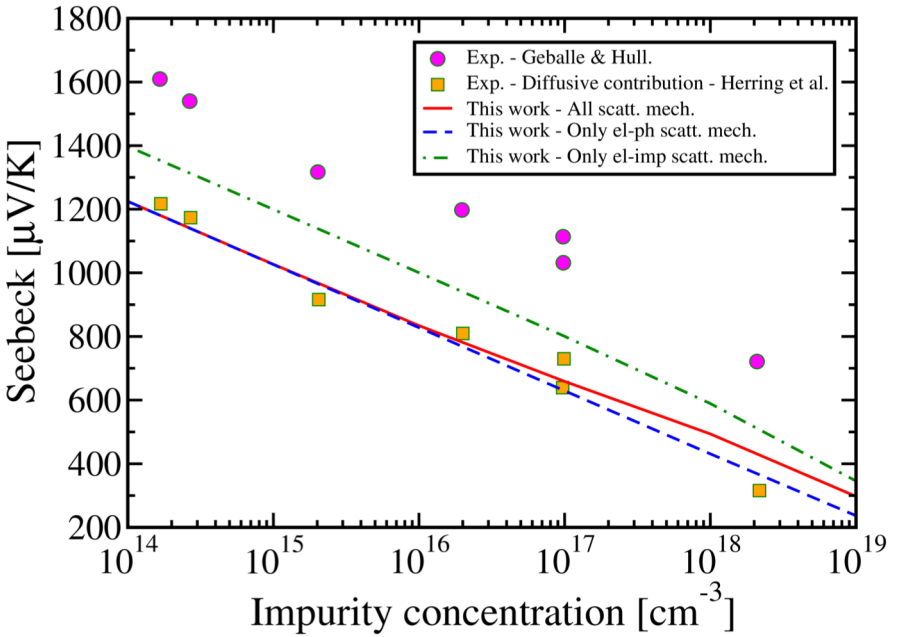


Test calculations: silicon

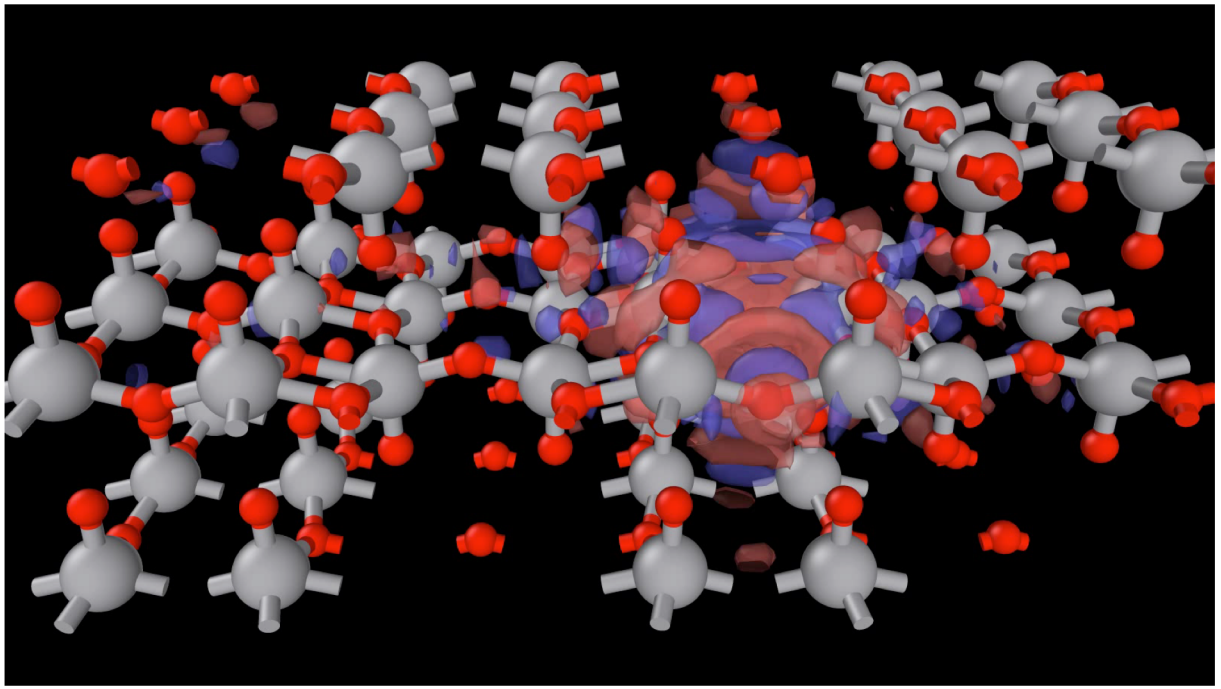
State of the art: DFT+ Wannier interpolation+ BTE

*Work in progress, post-doc of Dr. Raja Sen (**see poster**)*

ANCRE

French National Alliance for Energy Research Coordination

Charge dynamics at interfaces : V_2O_5 (photovoltaic applications)



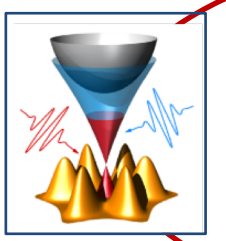
Oxygen atom that connects two vanadium atoms is perturbed and the electronic charge transfer not only within one layer but also mildly within the neighboring layers is observed. Similar charge transfer behavior is observed for excitons in this material.

Vitaly Gorelov et al., to be submitted. (2021)

Laboratoire des Solides Irradiés: research axes

Nano Materials and innovative devices

Electronic, photonic, and phononic excitations



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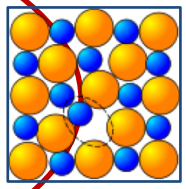
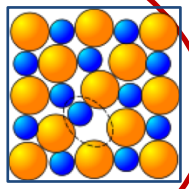


Laboratoire des Solides Irradiés: research axes

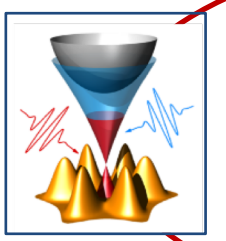
Nano Materials and innovative devices

Material properties (glasses, ceramics, semiconductors, superconductors) under irradiation

Exp: SIRIUS (electron accelerator)



Electronic, photon and phononic excitations



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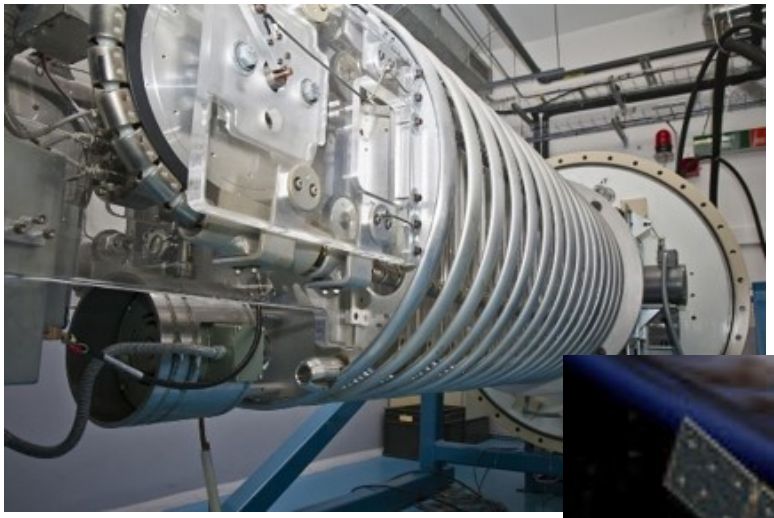
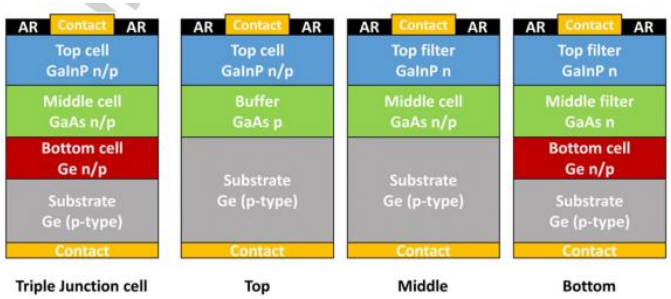
SIRIUS



Juice space mission

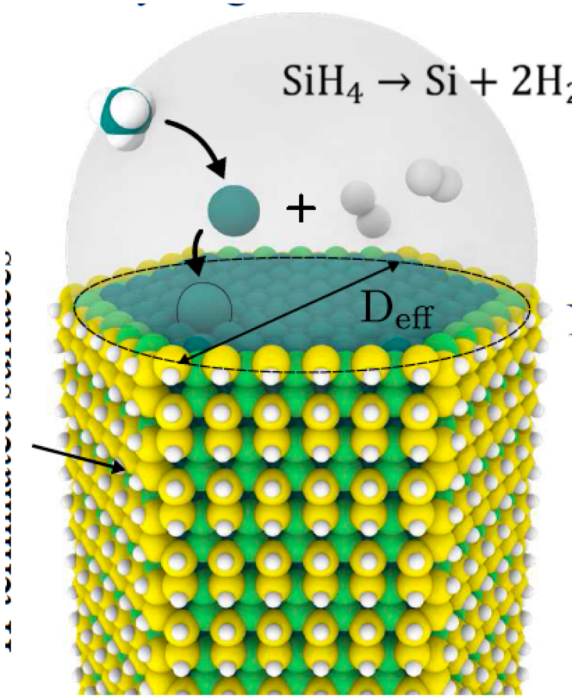


C. Weiss et al. Electron and proton irradiation effect on the minority carrier lifetime in SiC passivated p-doped Ge wafers for **space photovoltaics**, Solar Energy Materials and Solar Cells, 209, 110430, 2020.

Laboratoire des Solides Irradiés: research axes + GDR Name

Hexagonal silicon nanowires (theory)

DFT calculations: stability of 2H phase



ANR HexaNV

Stabilizing the hexagonal diamond metastable phase in silicon nanowires, R. Bejaud, O.H. Duparc, Computational Materials Science, 188,, 110180 (2021) ***see poster***

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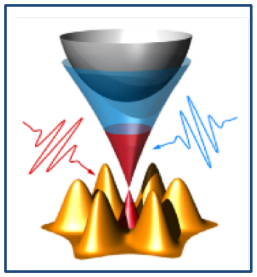

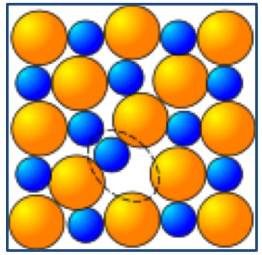

Thank you for your attention!

NAME

GDR Nanomaterials for Energy Applications

ELABORATION
MEASUREMENTS & METROLOGY
SIMULATIONS & THEORY
APPLICATIONS

https://portail.polytechnique.edu/lsi/fr/laboratoire/presentation