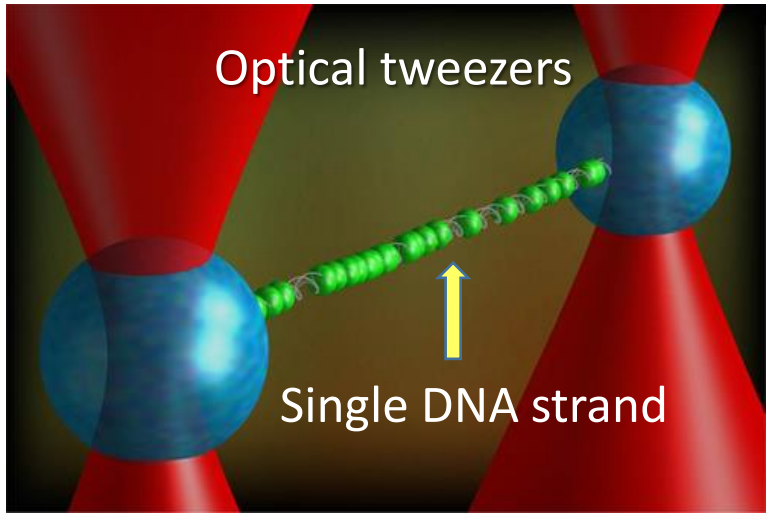
Quantum & Nano Optics @unime

The group is part of the macrogroup Micro and Nanosystems (MNS)

- Prof. Rosalba Saija
- Prof. Salvatore Savasta
- Dott. Roberto Stassi



MIFT DIPARTIMENTO DI SCIENZE MATEMATICHE E INFORMATICHE SCIENZE FISICHE E SCIENZE DELLA TERRA

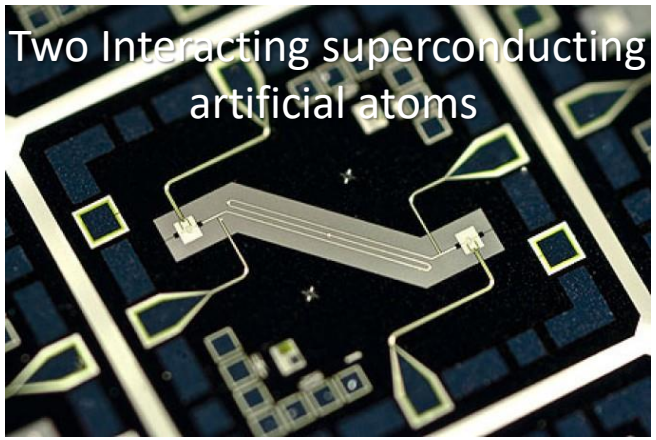
Collaborators

- Dott Omar Di Stefano
- Dott. Luigi Garziano

RIKEN

PhD students

- Francesco Patti
- Paolo Polimeno
- Alessio Settineri

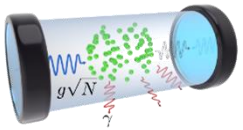


Main Collaborations

- Italy (unime, unict, unipa, CNR)
- Europe (Spain, UK, Switzerland, Sweden)
- Japan (RIKEN)

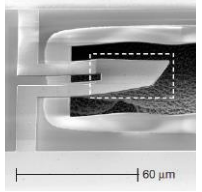
Quantum Condensed Matter Theory

- cavity-QED
- Superconducting Circuits and circuit-QED
- Quantum computation and information
- Cavity optomechanics
- Entanglement and Synthesis of Quantum states in HQSs
- Studies on the quantum vacuum

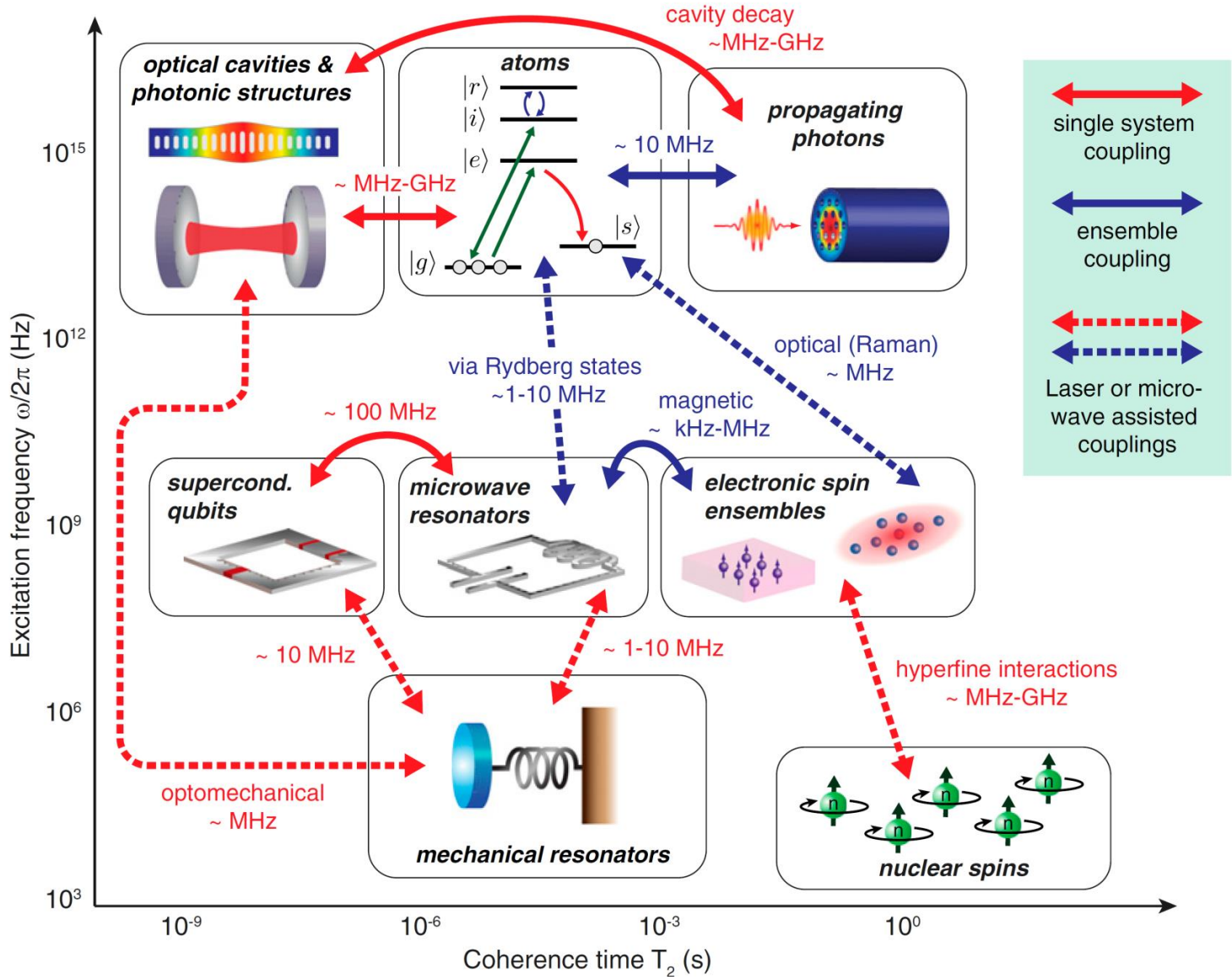


Thesis

- Cavity and Circuit QED
- Quantum Optomechanics
- Dynamical Casimir Effect
- Quantum Logic Gates
- Quantum Plasmonics



Hybrid Quantum Systems



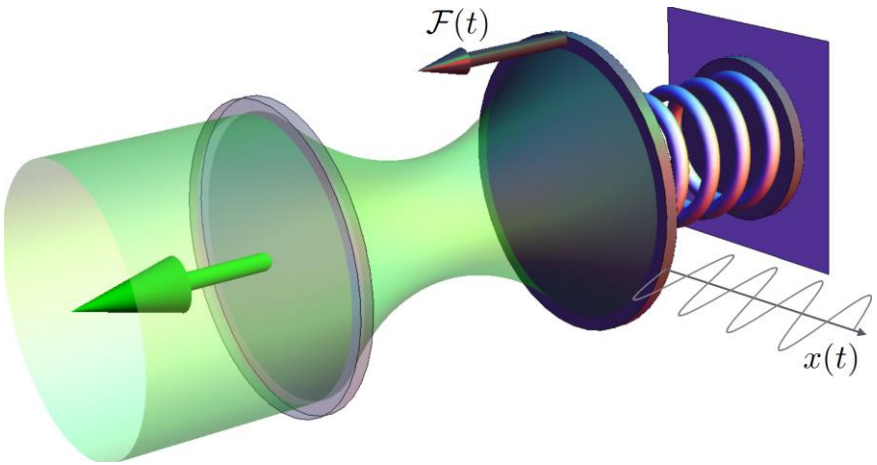
Highlights

Quantum optics

PHYSICAL REVIEW X **8,** 011031 (2018)

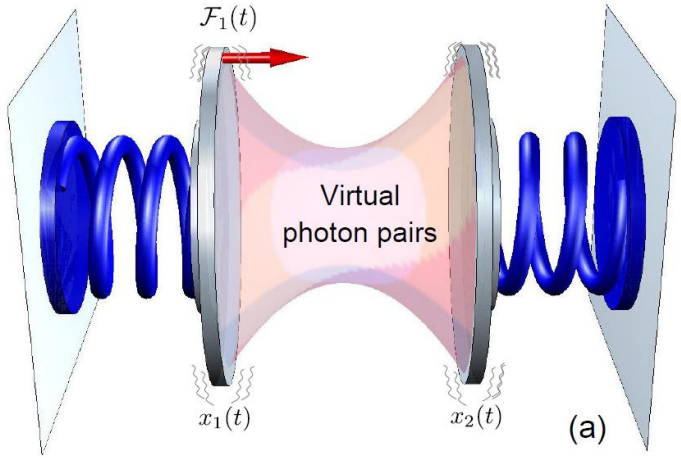
Nonperturbative Dynamical Casimir Effect in Optomechanical Systems: Vacuum Casimir-Rabi Splittings

Vincenzo Macrì,[1,2] Alessandro Ridolfo,[2] Omar Di Stefano,[2] Anton Frisk Kockum,[2] Franco Nori,[2,3] and Salvatore Savasta[1,2]



PHYSICAL REVIEW LETTERS **122,** 030402 (2019)

Interaction of Mechanical Oscillators Mediated by the Exchange of Virtual Photon Pairs

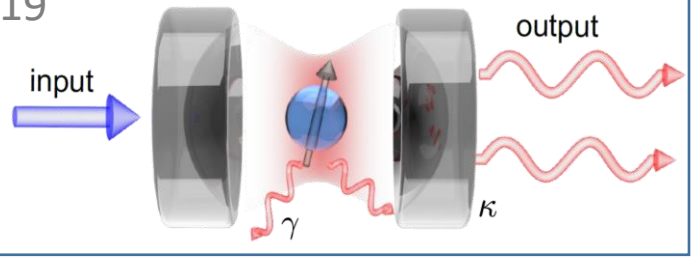


Sound transmission through nothing

Ultrastrong coupling between matter and light

2019

nature REVIEWS PHYSICS

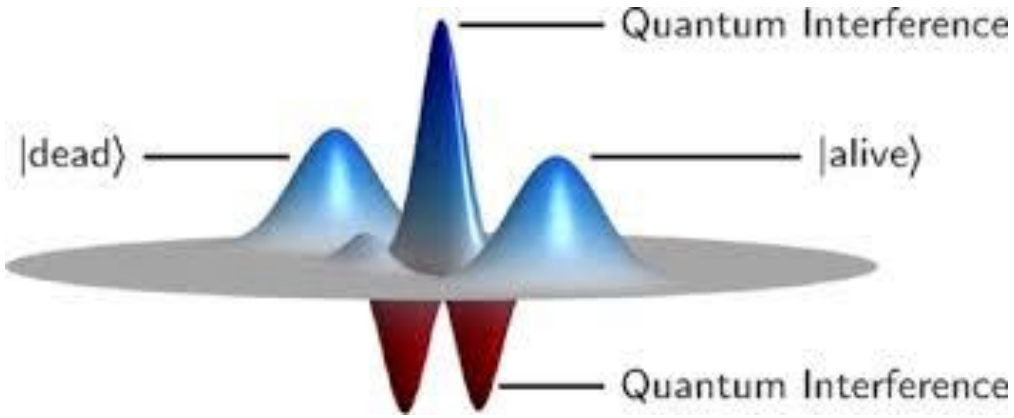


nature physics

Resolution of gauge ambiguities in USC cavity QED - 2019

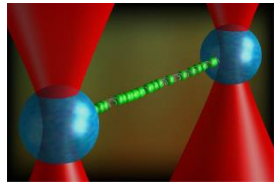
STAGE: Dinamica quantistica computazionale

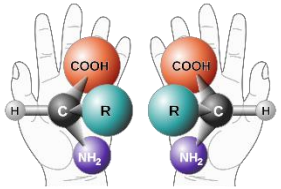
- Soluzione numerica dell’equazione di Schroedinger 1D e 2D con vari potenziali
- Dinamica di sistemi quantistici interagenti, scambio coerente di eccitazioni ed entanglement
- Sistemi quantistici aperti: approccio di Master equation, decoerenza e rumore termico
- Il principio di indeterminazione in azione: creazione di particelle dal vuoto quantistico



Elettromagnetic scattering

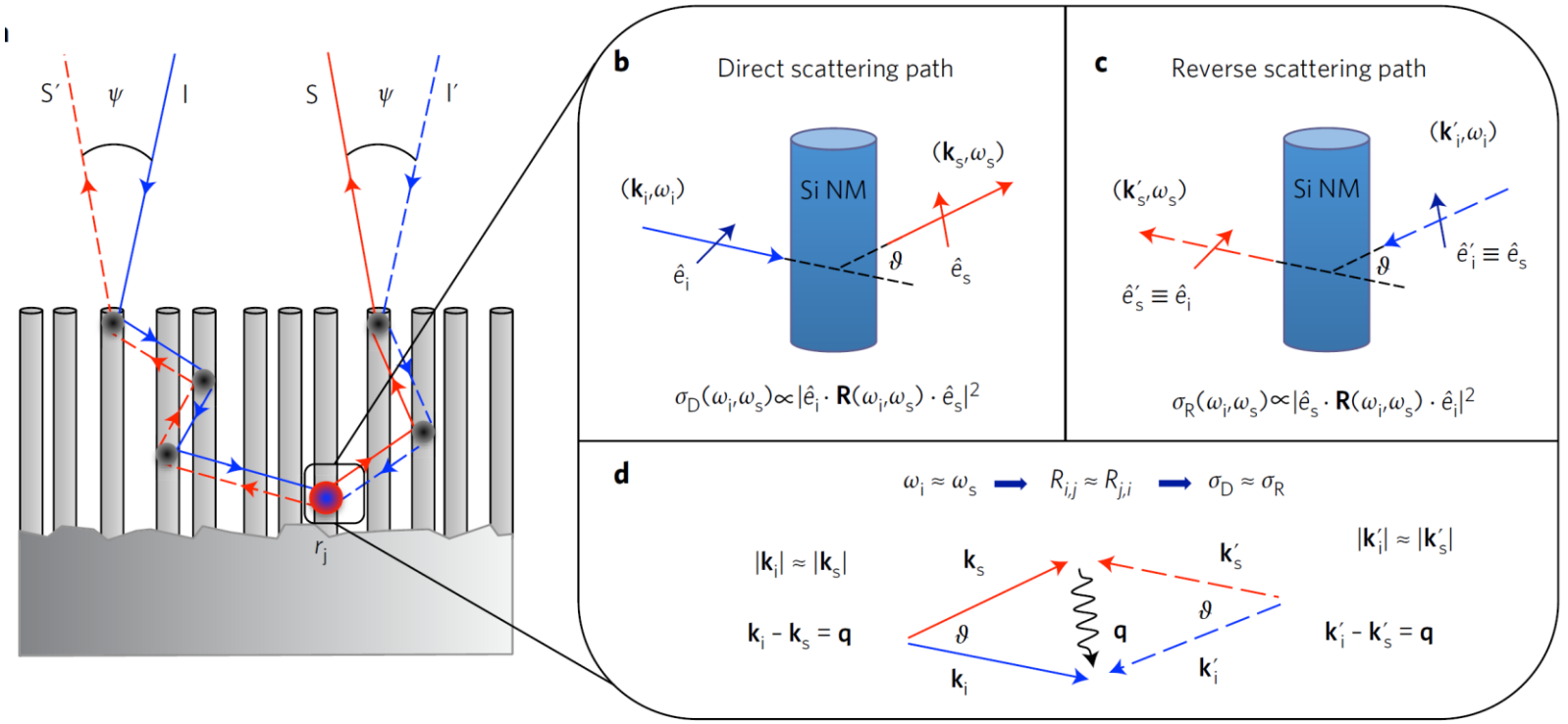
- Optics at the nanoscale
- Optical tweezers
- Chiral optomechanics
- Surface enhanced Raman Scattering
- Optical properties of disordered systems

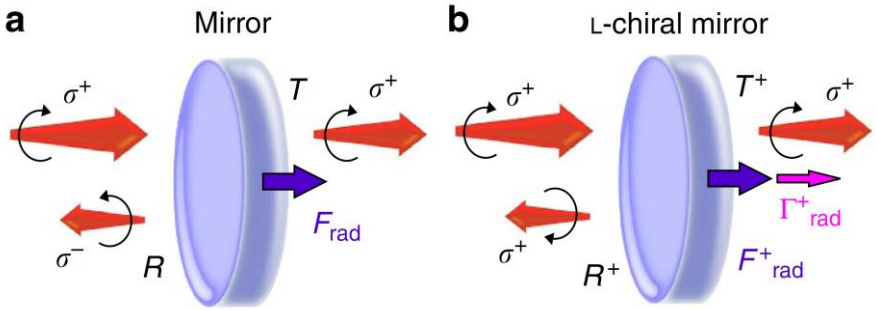


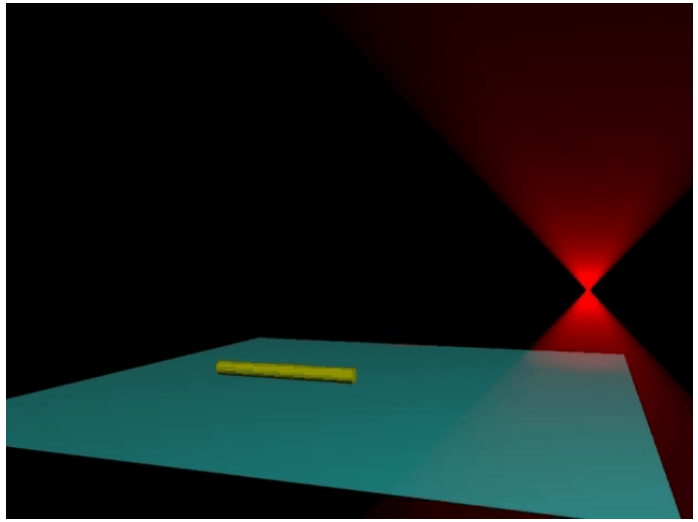


Thesis

- Chiral electromagnetism
- Radiation mechanical effects
- Radiation spin-orbit interaction



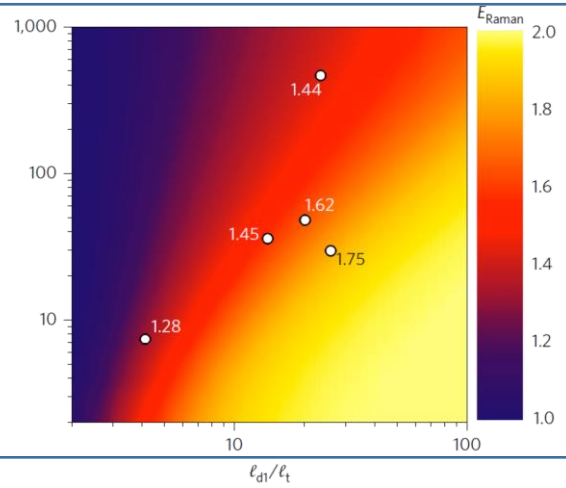




Coherent backscattering of Raman Light

nature photonics

2017



nature COMMUNICATIONS

Polarization-dependent optomechanics mediated by chiral microresonators

First full wave theory of optical tweezers!

Optical trapping of nonspherical particles in the T-matrix formalism

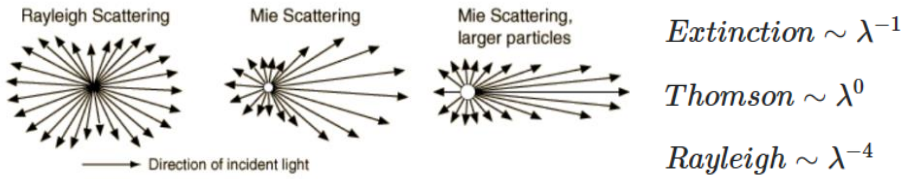
Optics Express 2007

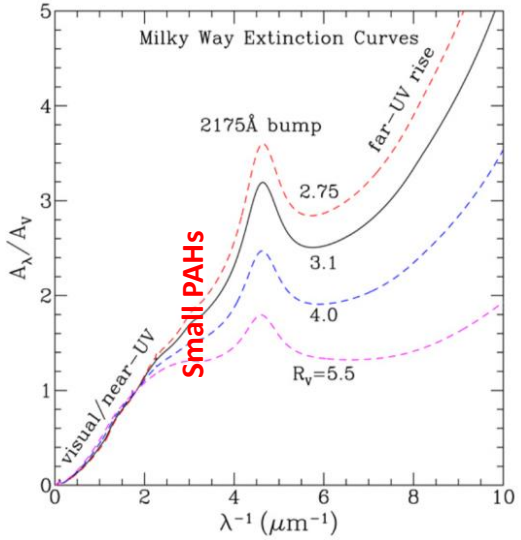
PRL **100,** 163903 (2008) PHYSICAL REVIEW LETTERS week ending 25 APRIL 2008

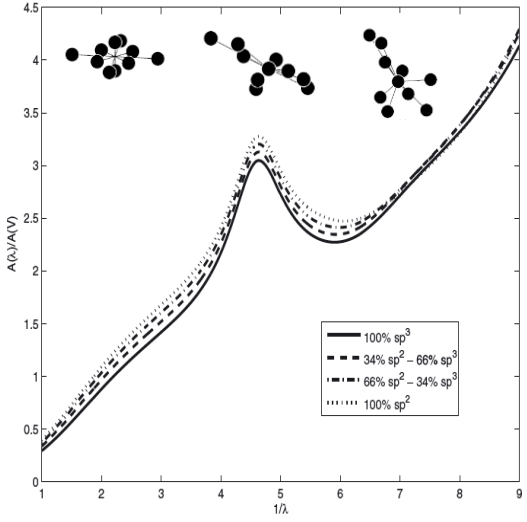
Radiation Torque and Force on Optically Trapped Linear Nanostructures

THE ASTROPHYSICAL JOURNAL, 559:993–1004, 2001 October 1

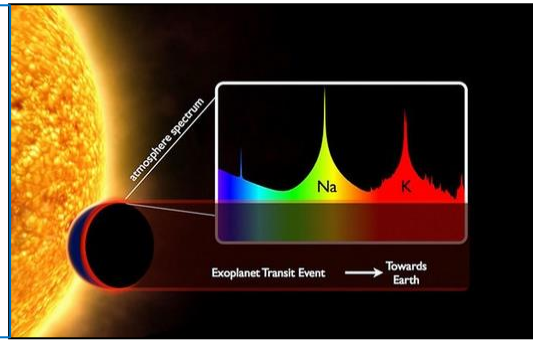
BEYOND MIE THEORY: THE TRANSITION MATRIX APPROACH IN INTERSTELLAR DUST MODELING







- Radiative properties of aerosols in solar and extrasolar planetary atmospheres.
- Aerosol cross-sections implementation in radiative transfer codes.



INAF-OP, INAF-OC, CNR-IPCF, Brno, Taiwan

- OT application to planetary exploration for in situ analysis.
- Trapping and spectroscopic characterization of extraterrestrial particles

INAF-OP, UNINA-Parth, CNR-IPCF, UNIPI, IIT@NEST, Brno, Taiwan