



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

**15-19 Luglio 2019 ore 14:30-16:15 presso l'aula F**

**il Dr. Alberto Zobelli**

Maître de Conference Laboratoire de Physique des Solides  
Université Paris Sud, France.



terrà il ciclo di lezioni di 10 ore dal titolo:

## **Introduction to Transmission Electron Microscopy**

Dr. Zobelli will first present the instrumentation and the basis of the main imaging modes. He will then describe the scanning transmission electron microscope and the principal spectroscopic techniques employed for materials characterization.

**July 15th aula F 14:30-16:15** The transmission electron microscope  
General presentation. Electron gun. Electron round lens. Aberrations. Resolution limit. Sample preparation

**July 16th aula F 14:30-16:15** Image formation in a TEM: diffraction contrast.  
Elastic scattering of electrons by an individual atom. Elastic scattering by a crystal : infinite crystal and finite crystal with size effect. Ewald sphere construction. Comparison of the electron diffraction and X-ray diffraction scattering factors. Diffraction contrast in a TEM. Bright field and dark field imaging modes.

**July 17th aula F 14:30-16:15** Image formation in a TEM: weak phase objects.  
Contrast Transfer Function. Weak phase object approximation. High resolution transmission electron microscopy. Optimum defocus in HRTEM

**July 18th aula N 14:30-16:15** The Scanning transmission electron microscope  
The STEM microscope. STEM bright field and dark field imaging modes. The Z contrast in high angle annular dark field. Aberration correction

**July 19th aula N 14:30-16:15** Materials chemical and spectral characterization within an electron microscopy.

Hyperspectral imaging within a STEM. Energy-dispersive X-ray spectroscopy. Electron energy Loss Spectroscopy. Cathodoluminescence. Nano-optics within a STEM

- Prof. Francesco Sedona
- Prof. Leonard Prins
- Gruppo di lavoro Didattica Nexus

**Il Direttore del Dipartimento  
Michele Maggini**