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Tuesday, 29th March 2022, 16:00 s.t.

TU Wien, Institut für Angewandte Physik, E134
1040 Wien, Wiedner Hauptstraße 8-10
Yellow Tower „B“, 5th floor, SEM.R. DB gelb 05 B

The seminar will be also held as a Zoom Meeting

<https://tuwien.zoom.us/j/9996013965?pwd=WXZLdk9vbXZUZXYyZER6d2hjUmlaZz09>

Meeting ID: 999 601 3965

Password: 1AGWerner5



Energy loss of charged particles in 2D materials, using the oscillator model

Adapting the oscillator model from [1] to a mono-atomic layer, we derive relativistic analytical expressions as a function of the relevant parameters of the process.

We develop the model for a wide range of incident energies and considering both parallel and perpendicular trajectories. We obtain several useful analytical expressions for the energy loss considering isotropic and anisotropic in-plane oscillators, for parallel and perpendicular trajectories of the particle.

We notice that in an anisotropic 2D-oscillators system, the energy loss due to single oscillator (and therefore the integrated quantities as stopping power and total energy loss) presents a reduction with respect to the isotropic case, especially in the parallel trajectory. We ascribe this effect to the lower availability of oscillation modes, and hence to a reduction of the interaction channels [2].

Finally, we remark that the present model stands out for its generality, and provides a direct evaluation of the energy loss processes in a generic 2D material.

References

- [1] *Classical Electrodynamics*, J. D. Jackson, John Wiley and Sons Ed., (1999)
- [2] Oscillator model applied to 2D materials: Energy loss of relativistic charged particles
Silvina Segui, Juana L. Gervasoni, Nestor R. Arista and Zoran L. Mivskovic
Nuclear Instruments and Methods in Physics Research B, 490, (2021), 18-24.

All interested colleagues are welcome to this seminar lecture
(30 min. presentation followed by discussion).

Friedrich Aumayr
(LVA-Leiter)

Wolfgang Werner
(Seminar Chair)