COMPUTATIONAL PROBLEMS FOR CHARGE TRANSPORT IN LOW DIMENSIONAL STRUCTURES

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ABSTRACT

The minisymposium will be concerned with the mathematical modeling and simulation of charge transport in semiconductors, graphene and other 2D materials and structures, like double gate MOSFETs, nanoribbons and nanowires, where the presence of confinement effects allows for the formal description of the carrier flow as that of a two-dimensional or one-dimensional electron gas [1, 2]. Lately, it has also been realized that, by increasing the miniaturization of devices, hot spots are observed, zones with very high crystal temperature due to the release of energy by high energetic electrons. The effect is particularly relevant in materials with reduced dimensionality and confined structures.

For these reasons, the mini symposium will foresee the discussion of the following arguments: ab initio calculations to furnish the correct band structures for the materials; thermal effects in the crystal lattice; rippling in suspended graphene; Monte Carlo simulations; Wigner transport equation; nonlinear dynamics in charge transport; numerical schemes for the charge carrier transport equation; fluid models deduced from the kinetic transport equations. Two Sessions are foreseen.

**REFERENCES**

[1] V. D. Camiola, G. Mascali, V. Romano, *Charge Transport in Low Dimensional Semiconductor Structures*, Springer, 2020.

[2] L. Barletti, G. Nastasi, C. Negulescu, V. Romano, “Mathematical modelling of charge transport in graphene heterojunctions”, *Kinetic and Related Models*, Vol. **14**, pp. 407−427, (2021).