Curriculum Vitæ of Raffaele Resta (2020)

PERSONAL DATA

- Born in Genova, Italy, 21 february 1947.
- **Office address:** Dipartimento di Fisica, Strada Costiera 11, I-34014 Trieste; tel. +39 040 2240264.
- **Electronic mail:** <resta[at]iom.cnr.it>

EDUCATION

1965 "Maturità Classica", Liceo C. Colombo, Genova, Italy.
1969 "Laurea in Fisica", University of Pisa (*cum laude*).
1969 "Diploma", Scuola Normale Superiore, Pisa, Italy.

LANGUAGES

- Italian: mother tongue.
- English: professional level.
- French: very fluent.
- Latin: poor (despite eight years of classes).

POSITIONS

1969-71 Assistente incaricato, University of Pisa.
1971-83 Assistente ordinario, University of Pisa.
1975-83 Professore incaricato, University of Pisa.
1981-83 Professore incaricato, *Fisica dei Semiconduttori*, International School for Advanced Studies (SISSA), Trieste.
1983-94 Professore associato, *Fisica dei Semiconduttori*, International School for Advanced Studies (SISSA), Trieste.
1994-2017 Professore ordinario, *Struttura della Materia*, University of Trieste.
2017- Retired, Professore a contratto University of Trieste.
2017- Senior Research Associate, IOM-CNR (National Research Council).

TEACHING

Present:

- Course of "Geometria e Topologia nella Teoria della Struttura Elettronica", for fourth-year students in Physics at the University of Trieste (set of original lecture notes available).

Previous (undergraduate):

- University of Pisa;

– Ecole Politechnique Fédérale, Lausanne, Switzerland.
– University of Trieste.

Previous (graduate):

– International School for Advanced Studies (SISSA), Trieste;
– Troisième Cycle de la Physique en Suisse Romande: 1990, 1995, and 1999 (three sets of original lecture notes available).
– Cycles of lectures at the national graduate schools (Dottorato) of Pavia, Napoli, Bari, Cagliari, and Modena.

MANAGEMENT & ORGANIZATION (most relevant functions)

1983-95 Permanent member of the International Programme Committee of the "International Workshop on Computational Condensed Matter Physics".
1986-93 Member of the Consiglio Direttivo (board of directors) and member of the Giunta (core steering committee) of the Istituto Nazionale di Fisica della Materia (INFM).
2002-08 Divisional Associate Editor for Physical Review Letters.
2006– Fellow of the American Physical Society.
2010 Selected as "Outstanding Referee" by the American Physical Society.

RESEARCH

Since the beginning of my professional life, my main interest has been in the theory of materials. I have investigated over the years a large number of different materials and of different physical problems. I have used a variety of approaches, ranging from analytical theories and models to first–principle computations.

In the first part of my career the activity was centered in electronic band structure of crystalline materials and related topics (impurities, excitons, screening), with a few contributions to molecular physics. Worth mentioning from this early period is a widely quoted model dielectric function for semiconductors (1977).

Since the birthdate (about 1980) of the modern computational theory of materials, my mainstream research activity has been in the area of computational physics. I have been a coauthor of the first ab-initio calculation ever of (i) dielectric constants (1986), (ii) piezoelectric constants (1989), (iii) spontaneous polarization in pyroelectrics (1990) and (iv) ferroelectrics (1993).

I am a coauthor of the so-called "modern theory of polarization", based on a Berry phase (1992 onwards). This has revolutionized the common wisdom about polarization even as a matter of principle, besides providing a powerful computational tool. The Berry phase is now implemented as a standard option within most electronic–structure code packages. I am also a coauthor of the analogous "modern theory of orbital magnetization" (2005 onwards); its implementation at a first-principle level has started in 2010.

Since 1998 I have developed a novel general theory of the insulating state of matter, spawned by polarization theory. In the most recent years I have undertaken a general reformulation of the "geometrical" observables in condensed matter, which include polarization, orbital magnetization, anomalous Hall conductivity, Drude weight, XMCD sum rule, and more.