# Modeling the Physics of Nano-Friction

**From** 2013-05-01 to 2019-04-30, closed project

## Project Details

<table>
<thead>
<tr>
<th><strong>Total cost:</strong></th>
<th><strong>Topic:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 1 550 000</td>
<td>ERC-AG-PE3 - ERC Advanced Grant - Condensed matter physics</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>EU contribution:</strong></th>
<th><strong>Funding scheme:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EUR 1 550 000</td>
<td>ERC-AG - ERC Advanced Grant</td>
</tr>
</tbody>
</table>

**Coordinated in:** Italy

## Objective

In the next five years, novel nanoscale friction experiments will provide decisive data on the physics of a century-old, central, yet incompletely understood area of physics. Nano and mesoscopic phenomena without historical precedent in classic friction are emerging in tip based and other sliding and dissipation measurements. Opportunities for the control of friction, based on harnessing and modifying collective phenomena in the substrate are in the works; and fresh spectroscopic insights into the quantum phenomena in solids and surfaces are currently obtained by nanofrictional means. Finally, exciting laser based sliding nanosystems just appeared. All this experimental opulence demands a strong matching theoretical effort: and just that is the scope of this project. I and my group will model, calculate and simulate the frictional anomalies accompanying structural and ferroelectric phase transitions as an opportunity for friction control; and will pursue the noncontact dissipation anomalies as a local spectroscopic tool of electronic, magnetic and quantum transitions. A strong priority will be the theory and simulation of sliding in trapped colloids and cold ions on laser generated periodic potentials, where nanoscale and mesoscale sliding phenomena promise to be uniquely accessible. The range of approaches will cover phenomenology, model building and testing, molecular dynamics atomistic simulations of sliding, both empirical and ab initio, electronic and magnetic dissipation modeling; and ordinary condensed matter theory, along with non-equilibrium statistical mechanics. To achieve that scope, I will put together students, postdocs, and leading condensed matter theorists operating mostly in SISSA Trieste, but also in ICTP Trieste and elsewhere, assembling a strong team in good contact with European experimental groups. Their complementarity will allow this unified project to attain results much beyond what the team members could individually achieve.

## Related Information

**Report Summaries**

- Final Report Summary - MODPHYSFRICT (Modeling the Physics of Nano-Friction)

## Principal Investigator

Erio Tosatti  
Tel.: +39 040 3787438  
Fax: +39 040 3787249  
E-mail
Host Institution

SCUOLA INTERNAZIONALE SUPERIORE DI STUDI AVANZATI DI TRIESTE
VIA BONOMEA 265
34136 TRIESTE
Italy

EU contribution: EUR 1 287 440

Activity type: Higher or Secondary Education Establishments

Administrative contact: Gabriele Rizzetto
Tel.: +32 040 3787201
Fax: +32 040 3787249
Contact the organisation

Beneficiaries

SCUOLA INTERNAZIONALE SUPERIORE DI STUDI AVANZATI DI TRIESTE
VIA BONOMEA 265
34136 TRIESTE
Italy

EU contribution: EUR 1 287 440

Activity type: Higher or Secondary Education Establishments

Administrative contact: Gabriele Rizzetto
Tel.: +32 040 3787201
Fax: +32 040 3787249
Contact the organisation

UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION -UNESCO
PLACE DE FONTENOY 7
75352 PARIS
France

EU contribution: EUR 262 560

Activity type: Research Organisations

Administrative contact: Fernando Quevedo
Tel.: +39 040 2240251
Fax: +39 040 2240410
Contact the organisation

To know more

http://erc.europa.eu/

Last updated on 2017-08-27
Retrieved on 2019-08-31

Permalink: https://cordis.europa.eu/project/rcn/107051_en.html