

High-energy particles from galactic cosmic rays and from solar flares damage both spaceship materials and astronauts' living tissue. Understanding how is the damage produced and how it could be mitigated is important for safe space travel. Simulation of the effect of high-energy projectiles in matter is therefore of great interest.

Details of the project:

Using programs capable of describing quantum electronic processes in condensed matter, the project aims to obtain from computer simulations the effect of ion particles shooting through selected materials, both transient and long-lived damage.

Description of the research group:

The [Theory group](#) of Nanogune has ample experience in the description of condensed matter from first-principles simulations, in general, and in the simulation of radiation damage, in particular. For more information, see our website at <https://www.nanogune.eu/en/research/groups/theory>

Tasks:

Establish and perform a series of large-scale calculations for various projectiles, on different materials targets, with varying projectile energy, impact parameter and trajectory direction. The particulars will be selected to be of relevance to space weather problems.

Objectives:

Understand the origins of radiation damage in selected materials (mostly solar cells and structural and shielding materials) and in basic components of biological tissue (relevant pieces of DNA in water).

Work materials:

The work is theoretical and computational, and will involve the use of supercomputers using parallel computing. The programs will be provided.

Application:

If you are a master student and you are interested in this project, please get in touch with the scientist in charge: **Emilio Artacho** (e.artacho@nanogune.eu).

To apply for a **master position** fill in the form below and follow the instructions and recommendations of the general call (**open until 31 July 2023**).

NOTES:

(i) All applicants will receive an answer after the end of the selection process; but please note that due to the large number of submissions that are expected, we cannot provide individual feedback.

(ii) Additional information about nanoGUNE's commitment towards [HR excellence in Research and Gender Equality](#) are available on our website.

(iii) We encourage you to subscribe to our [HR mailing list](#) to receive information related to nanoGUNE's open positions and open calls for different training and talent attraction programs.