**Abstract**

Optimization through parallelization of the provided sequential code (based on the EduHPC’18 *Peachy Assignment* from the Trasgo Research Group of the Universidad de Valladolid). The goal is to improve the performance values when dealing with large sets of data. Parallelization achieved through OpenMp.

**Introduction**

The project for the course of Concurrency and Parallelism consists in the parallelization of a provided sequential program that simulates the effects of high-energy particles bombardment on an exposed surface, using the OpenMP programming model.

The program receives as input several files that represent waves of high-energy particles. It then computes the accumulated energy on each point of the surface after the impact of those waves. The program calculates and reports, for each wave, the point with the highest accumulated energy, which presents the higher risk of being damaged.

The main goal of this assignment is to improve the time performance of the source code, in particular when handling large sets of data (big number of particles). The challenge was, not only to find a way to parallelize the various sections of the sequential program, but also to analyse whether the achieved parallelizations are in fact worth it.

Our approach focused mainly on the identification and remotion of dependencies in the various loops present in the source code, followed by parallelization using OpenMP and analysis of the possible performance improvements.