



Development of efficient algorithms for the simulations and analysis of Stellar Intensity Interferometry data

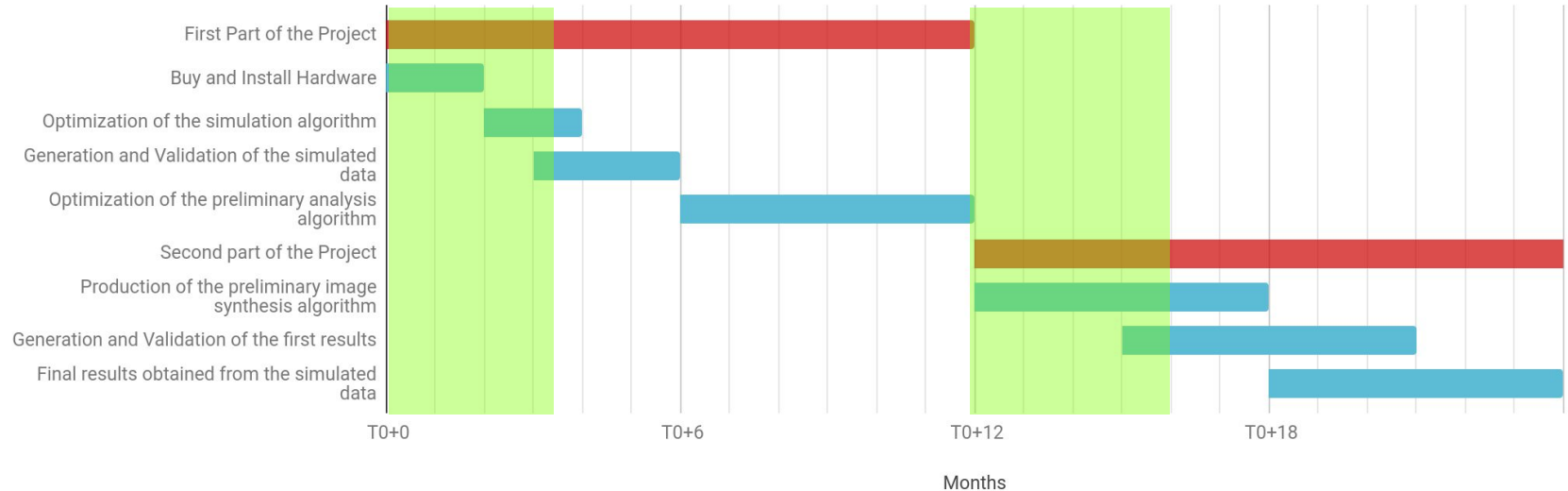
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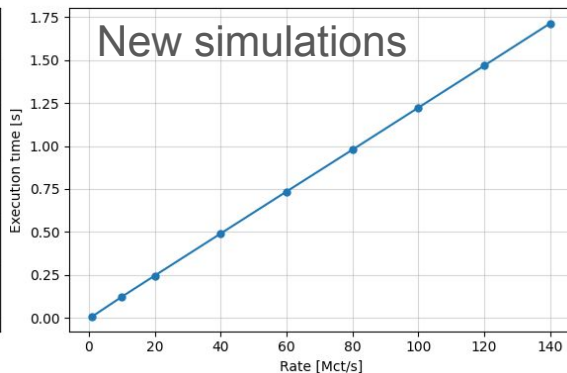
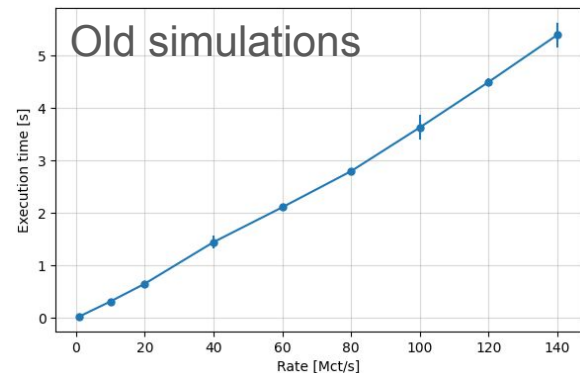
Through Stellar Intensity Interferometry (SII) we will be able to resolve, measure the size, and determine the spatial structure of bright stars (below 100 microarcseconds). INAF is involved in the development of the SII Instrument (SI3) for the ASTRI Mini-array, an instrument which will perform SII in photon-counting mode and in post-processing. This will require to implement efficient algorithms to analyze the data and to perform image synthesis. Simulations of SI3 data are needed to perform these tasks.

Status of the project

- Hardware needed for the project purchased in August 2023 (T0) and arrived in September 2023:
 - Supermicro server Sys-521E-WR, Intel Xeon Gold 5412U (24 cores), 4x 32GB DDR5 4800MHZ RAM, 10 TB fast NVMe storage.
 - Total price: 7915,36 €.
- Successfully installed and first tests completed.
- Before the purchase we also started the second part of the project.



Simulations of ASTRI-SI3 data

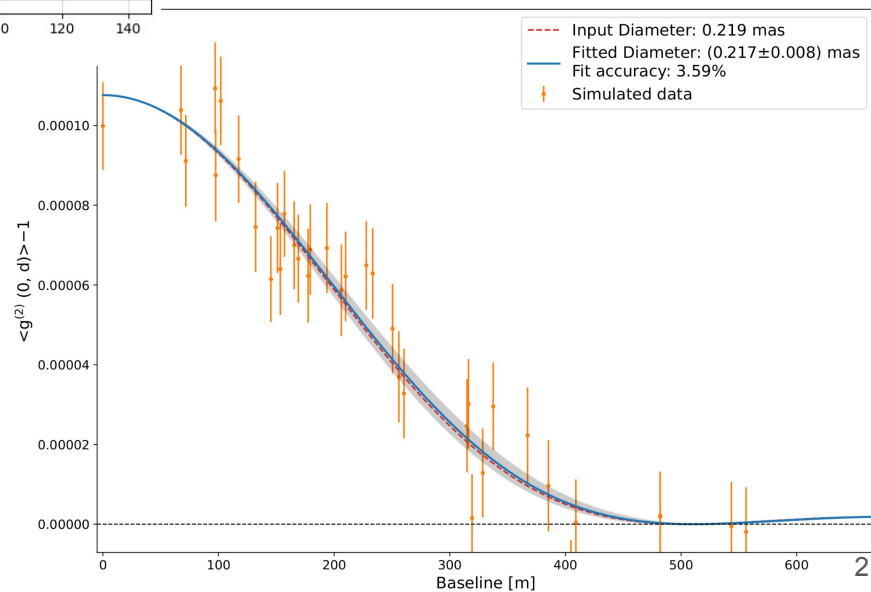


Started the optimization of the simulation algorithm.

- Already a boost in computing time: ~3x factor less time to simulate the data

Performed the first simulations for the second part of the project:

- Studied the performances of ASTRI-SI3 for observations of isolated stars in 1D.
- Implemented the U-V plane reconstruction and made the first 2D simulations in case of binary star systems.



Related activities and criticalities

- Presented the status of ASTRI-SI3 to a special session at the [EAS 2023](#).
- Master thesis in progress on the simulation of ASTRI-SI3 data in case of observations of binary star systems (M. Faccioni, UNIPD).
- Together with the PI of the main project (Interferometria di intensità con il Mini-Array ASTRI - Luca Zampieri) we have decided to purchase a GPU (with other funds) to further improve the computational capabilities. The installation of the GPU is planned for the beginning of 2024.
- Criticality: prices for hardware increased significantly from early 2022 to the beginning of 2023. We had to spend considerable time to find other hardware solutions that could guarantee the same performances with the same amount of funds as requested in the proposal.