Escuela de Programación para Investigación Científica - EPIC III

Report of Contributions

https://indico.global/e/12951

Contribution ID: **34** Type: **not specified**

Arrival to YT Campus

Sunday 13 August 2023 14:00 (4h 30m)

Contribution ID: **35** Type: **not specified**

Inaugural session

Monday 14 August 2023 08:00 (40 minutes)

Welcome to PWF and EPIC 3

Contribution ID: **36** Type: **not specified**

Talk: The Frontiers of Computational Physics

Monday 14 August 2023 08:40 (40 minutes)

Today computers and computation is part of everyday life and one of the essential components of science. To name some examples, our mobile phones are more sophisticated computers than the first PCs, our IDs tend to be digital, everyone has emails and most people have mobile banks. In the last few months the new artificial intelligence (AI) softwares have generated much attention, however AI has been behind many computer applications for several years. Computation in the sciences has had a long history since the planning of the first Moon Landing in the 1960 to todays most advanced supercomputers. One of the obvious fields of scientific computing is the more and more complex theoretical computer simulations that drive the development of supercomputers. Another important fields are the computers that power the instruments of experimental research. For example, the brains of modern radio telescopes and large particle accelerators are supercomputers as well. In addition, to taking and generating data it is also essential to have the tools to analyse, visualise and disseminate this data. Having a good knowledge of computing these days can open the doors for working in sciences, in industry and in public offices.

Presenter: DENES, Helga (Yachay Tech)

Contribution ID: **37** Type: **not specified**

Talk: Analysis of the generalized Starobinsky inflationary model

Monday 14 August 2023 09:20 (40 minutes)

In this work we solved the equation of scalar and tensor perturbations for the generalized Starobinsky inflationary model using the improved uniform approximation method and the phase-integral method up to third-order in deviation. We compare our results with the numerical integration. We have obtained that both semiclassical methods reproduce the scalar power spectra P, the scalar spectral index nS, and the tensor-to-scalar ratio r. Also we present our results in the (nS,r) plane.

Presenter: ROJAS, Clara (Yachay Tech)

Contribution ID: **38** Type: **not specified**

Tutorial: FFT methods for fluid dynamics

Monday 14 August 2023 10:40 (1h 40m)

In this tutorial you will learn to use Fast Fourier Transform algorithms in python to solve parabolic and hyperbolic partial differential equations. There will be guided examples on how to solve the fluid dynamics equations and you will have the chance to work on proposed problems too.

Presenter: BANDA BARRAGÁN, Wladimir (Yachay Tech)

Contribution ID: **39** Type: **not specified**

Tutorial: Monte Carlo methods for physics

Monday 14 August 2023 14:20 (1h 40m)

In this tutorial you will learn to carry our Monte Carlo simulations in python with the purpose of studying physical systems. There will be guided examples on how to carry out Monte Carlo simulations, and you will have time to work on a proposed problem too.

Presenter: BANDA BARRAGÁN, Wladimir (Yachay Tech)

Contribution ID: **40** Type: **not specified**

Talk: Using deep learning to understand fish development

Tuesday 15 August 2023 08:00 (40 minutes)

The Pseudospectra is a powerful tool to analyze the behavior of dynamic systems associated to non-normal matrices. Studies and applications have increased in the last decades, thus, its efficient computation has become of interest for the scientific community. In the large scale setting, different approaches have been proposed, some of them based on projection on Krylov subspaces. In this talk, we will present a scheme for the parallel computation of the Pseudospectra, based on a domain decomposition of the interest region into subregions that can be assigned to a set of processors in order to accelerate the computation.

Presenter: MORALES NAVARRETE, Andres (U Konstanz)

Contribution ID: **41** Type: **not specified**

Talk: Pseudospectra of matrices and its computation

Tuesday 15 August 2023 08:40 (40 minutes)

Presenter: CASTILLO, Zenaida (Yachay Tech)

Contribution ID: **42** Type: **not specified**

Talk: The framework ROOT CERN and its use in particle physics

Tuesday 15 August 2023 09:20 (40 minutes)

Data analysis is a key component of experimental physics, this is why the knowledge of frameworks and programming languages is necessary for physicists. In particle physics for example, the ROOT framework is widely used because of its graphical interface for interactive analysis and its capacity to store and analyze large sets of data of more than 1 exabyte. In this talk, I will be introducing briefly the functionality of ROOT and relating it to my own research: the amplitude analysis of three-body decays.

Presenter: LOACHAMIN, Gustavo (PUC Rio de Janeiro)

Contribution ID: **43** Type: **not specified**

Tutorial: Introduction to BioImage Analisys with Python

Tuesday 15 August 2023 10:40 (1h 40m)

Explanation about bioimages (i.e. fluorescence microscopy), Bioimage analysis example: quantifying cell morphology from 2D fluorescence micrographs, Importing images and plotting images, Logical operators (pixel-wise operations), Intensity Transformation, Filters and Fourier transformations, Segmentation, Extracting data from segmented images (e.g. cell area, elongation).

Presenter: MORALES NAVARRETE, Andres (U Konstanz)

Contribution ID: **44** Type: **not specified**

Tutorial: Deep learning for analisys and modelling of biological systems

Tuesday 15 August 2023 14:20 (1h 40m)

Presenter: MORALES NAVARRETE, Andres (U Konstanz)

Contribution ID: **45** Type: **not specified**

Tutorial: Excited-state dynamics

Wednesday 16 August 2023 08:00 (2 hours)

Photoinduced processes play a crucial role in different fields of science, for example, the photoisomerization of the retinal chromophore or the synthesis of vitamin D3. Additionally, they are crucial in the development of new technologies such as molecular electronic devices which can be controlled by light. These processes are governed mainly by nonadiabatic transitions which are radiationless electronic transitions between different non-Born-Oppenheimer states along the dynamic of a chemical reaction. In these two lessons, we are going to implement the Tully algorithm in Python to study a simple avoid crossing model as the first approach to a non-adiabatic transition.

Presenter: SALAZAR, Edison (U Groningen)

Contribution ID: **46** Type: **not specified**

Talk: Realidad histórica astronómica de la línea equinoccial. Reedición del experimento de Charles Marie de La Condamine

Wednesday 16 August 2023 10:40 (40 minutes)

Relatos y referencias históricas de las circunstancias e incidencias que llevaron a la creación del metro como unidad de medida de longitud por parte de los académicos de la Mision Geodesica francesa en Quito el año de 1744.

Presenter: HERRERA, Nelson (UIDE)

Contribution ID: **47** Type: **not specified**

Talk: TBD

Wednesday 16 August 2023 11:20 (1 hour)

Presenter: MORALES, Diego (Yachay Tech)

Contribution ID: **48** Type: **not specified**

Tutorial: Introduction to Particle Physics Analysis with Python

Wednesday 16 August 2023 14:20 (1h 40m)

Presenters: GOMEZ ESPINOSA, Alejandro (ETH Zurich); GOMEZ ESPINOSA, Alejandro

Contribution ID: **49** Type: **not specified**

Tutorial: How to analyse 3D astrophysical data cubes

Thursday 17 August 2023 08:00 (1h 20m)

Brief explanation on astrophysics behind galaxies and their neutral hydrogen (HI content). Reading in fits data cubes (3D spectral line data - HI data of a galaxy). Plotting slices of the 3D data cube and making moment maps. Downloading astronomical images from a database (for the same galaxy as the HI data). Making an overlay of the HI data onto an optical image. Calculating some basic statistics for the spectra. Averaging the spectra for the galaxy. Calculating the HI mass of a galaxy. Fitting a Gaussian to spectra

Presenter: DENES, Helga (Yachay Tech)

Contribution ID: **50** Type: **not specified**

Talk: Loxa Smart, a protoype of smart and sustainable city

Thursday 17 August 2023 09:20 (20 minutes)

Presenter: JACOME, Roberto (UIDE)

Contribution ID: **51** Type: **not specified**

Talk: Detección de la atención en clases virtuales a través de las acciones en el ordenador

Thursday 17 August 2023 09:40 (20 minutes)

Presenter: PALACIOS, Milton (UIDE)

Contribution ID: **52** Type: **not specified**

Talk: Hydrodynamic shielding in galactic multicloud outflows

Thursday 17 August 2023 10:40 (20 minutes)

Presenter: VILLARES, Andres (Yachay Tech)

Contribution ID: **53** Type: **not specified**

Contributed talks

Thursday 17 August 2023 11:00 (1h 20m)

Isabel Balvoa
Mayra Tualombo
Karla Conde
Daniel Cordova
Miguel Agama
Lizbeth Lara
Vicente Arévalo

Contribution ID: **54** Type: **not specified**

Student group talks

Friday 18 August 2023 08:00 (2 hours)

Group 1: Monte Carlo methods
Group 2: Computational Fluid Dynamics
Group 3: Bio-image analysis
Group 4: Deep learning methods
Group 5: Materials Science A
Group 6: Materials Science B
Group 7: Particle Physics
Group 8: Astrophysics A
Group 9: Astrophysics B

Contribution ID: **55** Type: **not specified**

Talk: La vocación de las mujeres para estudiar carreras STEM: una mirada de Ecuador

Friday 18 August 2023 10:40 (40 minutes)

The social and historical construction of the role of women in society has been the subject of study of several feminist theories, which attempt to highlight the dichotomy in philosophical and socio-cultural thought that validates the distribution of activities based on sex. The public, rational and technical has been relegated to men, while women represent the sensitive, emotional and private. This structure of stereotypes that is reproduced generationally allows us to discern the reasons why there are fewer women pursuing STEM careers. Identifying the reasons that drive women in their choice of a university career allows us to establish strategies to promote the vocation of women who are oriented towards science, technology, engineering and mathematics in Ecuador. The research also seeks to quantitatively evaluate the academic performance of women in STEM careers; and to analyze the participation of women in the field of research in higher education.The objective of the project is to analyze the factors motivating women to pursue STEM careers in Ecuador, Kazakhstan and India.

Presenter: VIZCAINO, Paulina (UIDE)

Contribution ID: **56** Type: **not specified**

Forum: Women in STEM

Friday 18 August 2023 11:20 (1 hour)