HANDS-ON SESSION

- **DRAGON (Pedro de la Torre Luque)**

    1. What is DRAGON2 → (i) What the code is intended for; (ii) its structure and how it is written; (iii) explanation of the solver of the propagation equation and the modules to the different ingredients of the code..

    2. DRAGON2 INPUTS: (i) Structure of the input and basic options ; Explanation of the basic parameters in the input (Electrons, nuclei, antiprotons); (ii) Show how to implement simulations with 2D and 3D structure of the Galaxy. (iii) We will elaborate an input that reproduces the spectra of primary cosmic rays and tune the diffusion coefficient to reproduce the boron-over-carbon flux ratio.

    3. Outputs: How to read the different outputs and what we can study from the input that we have created previously. Jupyter notebooks are prepared to visualize and plot the results.

    4. Show examples from some of the recent scientific contributions with the DRAGON2 code.

    Installation instructions are detailed at: https://github.com/tospines/ISAPP-school-2021_HandsOn-DRAGON2/blob/main/Installation_instructions-DRAGON2

    Jupyter notebook, inputs and outputs to be downloaded by the participants, as well as the instructions to download and install the code used in the session can be found at: https://github.com/tospines/ISAPP-school-2021_HandsOn-DRAGON2.

    For more information about the code used in the session, the participants can directly visit the official code's website : https://github.com/cosmicrays/DRAGON2-Beta_version

    DRAGON2 technical papers can be found at:
    - Numerical solver and astrophysical ingredients https://arxiv.org/abs/1607.07886
    - Nuclear interactions with the interstellar gas https://arxiv.org/abs/1711.09616

    Any questions before or after the session could be asked via email at: pedro.delatorreluque@fysik.su.se

- **HERMES (Ottavio Fornieri)**

    1. What is HERMES and what it is meant for: (i) basic structure of the code, (ii) required astrophysical ingredients, (iii) modularity of the Skymap containers based on the required process's calculation.

    2. Explanation of the output: HEALPix visualization in Galactocentric coordinates. Conversion to a cartesian visualization in the same coordinate system.

    3. Detailed explanation of a prepared Jupyter notebook, with instructions to calculate the γ- ray emission from a standard 2D cosmic-ray distribution, both for the full sky and for a restricted window.

    The updated version of HERMES can be installed following the instructions at the link: https://github.com/cosmicrays/herme: the use of a virtual environment is strongly recommended.

    The preprint of the HERMES' technical paper can be found on arXiv: https://arxiv.org/abs/2105.13165.

    A few slides and the Jupyter notebooks that will be used during the session can be found at: https://github.com/ottaviofornieri/ISAPP-school-2021_HandsOn-Diffuse_HERMES.

    Any questions before or after the session can be asked via email at: ottavio.fornieri@desy.de