Proposal for support to APPEC-ECFA-NuPECC Expressions of Interest

The Expressions of Interest (EoIs): after the [JENAS2019](#) meeting, the ECFA, APPEC and NuPECC Chairs issued a call for [EoIs](#) to the Communities aimed at tightening the scientific and technological links of at least two of the communities, ideally all three. Two EoIs are received on Dark Matter and on optimizations of detectors based on Machine Learning. A third one is being prepared and is born in the EuCAPT community.

The EoI on DM has been described in the [APPEC Newsletter](#) by proposers (M. Cirelli, C. Doglioni, G. Lanfranchi. F. Riedl). About 200 people have endorsed it, as visible in the [web site](#). The objective is to adopt a broad-minded approach for the challenge of identifying DM nature setting up a data platform for joint interpretation and analysis of data also in connection to the EOSC project [ESCAPE](#) and with [EuCAPT](#). The EoI aims at establishing a *virtual forum across communities to exchange results, theory progress, develop common language/benchmarks, town meetings, …* The ML detector optimization EoI was submitted by T. Dorigo et al. and) proposes a wide-range study of detector optimization, using ML technology for the optimization of the design, and targeting the future capabilities of specialized artificial intelligence technology for the event reconstruction. *The EoI would foster a network of experts to organize the work towards this important task which applies to experiments in the field of the three communities.* The EoI on gravitational waves for fundamental physics is directed by Tetyana Galatyuk (Prof at TU Darmstadt, from the nuclear physics / accelerator community) and Paolo Pani (Ass. Prof. in Rome, from the GW / Fundamental Physics community) and it is supported by the EuCAPT community and also by ESCAPE. Gravitational waves probe the particle nature of DM, for instance considering the fraction in black holes, the properties of nuclear matter through the study of neutron star mergers and new physics in the early universe through phase transitions.

APPEC proposes to nominate **2 experts per Eo**I : For the GW EoI J. van den Brandt (Nikhef, Virgo) and Tomek Bulik (PL, Astrocent, Virgo, CTA); For the ML EoI: Elena Cuoco (Virgo) and Jurgen Brunner (CPPM, Marseille, KM3NeT & IceCube); for the DM EoI (U. Oberlack, Mainz, XENON, Francesca Calore, LAPP Phenomenology/Astrophysics). ECFA has proposed as ML task force Marek Tasevsky (FZU, Cz) and Mikko Voutilainen (HIP,Fi) and on the DM topic Claude Vallée and Isabell Melzer-Pellmann (DESY, G).
The panel will advise the proponents on the path towards supporting their initiatives and funding applications and to gain visibilities in the three communities. It will also organize a dedicated session at the coming JENAS foreseen in 2021.

The proposal is that APPEC could engage further with a one time spending sum of 10kEuro. Short proposals for motivations on spending on specific items would be encouraged from the EoI proponents and then scrutinized by the panel, who would issue a recommendation to APPEC GA on which items to finance between the following items:

1) Workshops, kick-off meetings
2) Schools, Cycles of seminars
3) Developments of Web tools, Citizen Science items from a company or Institute covered by APPEC…
4) Officer professional science writer in a company or institute involved in APPEC…to support in an EC network proposal submission.

At the moment, the position of ECFA is that they do not have a direct budget to function but that in-kind contributions are possible. Once the panel enters in the discussion with the EoI promoters, under the option that joint work can happen between the three communities,

Institutes might become interested to contribute in-kind for hosting meetings, workshops, schools. The chair would then be available to explore in the ECFA community.

The position of NuPECC is that they can support the EoI process with very limited funds (few k€) but this kind of support for any action is done after consideration (usually at the plenary meetings) of a well-defined project. It is desirable also that the full process leads to EC applications.