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To the members of the
selection committee of the
Young Academy of Spain

CERN, Jan. 30, 2020

Subject: Letter of reference for Dr. Pablo Martinez Ruiz del Arbol

To whom it may concern,

it is a pleasure for me to provide a letter of reference in strong support of the application of Dr. Pablo Martinez Ruiz del Arbol for membership in the Young Academy of Spain. I am an experimental particle physicist, senior staff at the Institute of High Energy Physics of the Austrian Academy of Sciences, and I know Dr. Martinez since many years from my activities and coordination roles in the CMS Collaboration, in particular in the area of searches for new phenomena beyond the currently established standard model of particle physics.

In order to set the scale, I would like to start by saying that the CMS Collaboration is one of largest scientific collaborations worldwide, with about 3000 physicists (including about 1000 PhD students) members, working for more than 200 institutions in 55 countries around the globe. Performing research in this environment requires not only to deal with the complexity of the experimental apparatus, operating at CERN's

LHC, but also to face challenges due to strong competition both internal in the collaboration, and from other experiments, and also organizational challenges.

During the preparation for data taking and the first years of operation, Dr. Martinez made strong contributions to the calibration of the measurements of different objects used in the analysis of LHC data, in particular muons, and energy calibration of jets initiated from b-quarks. These are essential elements in most analysis efforts in CMS.

His research with CMS data is mainly targeting searches for new phenomena beyond the predictions of the current standard model of particle physics. These searches are motivated by the deficiencies of the latter, in particular, the open questions of the nature of dark matter, and of hierarchies of particle masses. Much of his work is motivated by supersymmetry, a global and promising extension of the standard model that constitutes one of the research priorities in the sector. I followed his work as coordinator of the corresponding CMS working group. Dr. Martinez was a driving force of early searches using events with two charged leptons, one of the cleanest and most promising channels in these searches. He then moved his focus to experimentally more challenging categories of collision events in order to investigate scenarios that might have been missed in data taken in the first years of LHC running, such as searches for supersymmetric partners of leptons or top quarks, again at the leading edge of research in the sector.

Dr. Martinez performed many of these analyses while holding a position at the prestigious Swiss Federal Institute of Technology Zurich (ETHZ). His expertise in the field, and his organizational skills, were recognized by the collaboration by entrusting him successively with the leadership of two working groups related to searches for supersymmetry. In the first of these positions he had the task to coordinate and review work on the selection of candidate signal events during data taking - critical tasks that determine which data will be available for future analysis, performed under strict timing constraints. The second position was the responsibility of the working group covering all searches for supersymmetric partners of tau leptons, beauty, and top quarks, one of the most thriving sectors in the last years. In the latter role, he was in charge of coordinating the work of researchers from some 20 institutions, giving advice on the priorities, and performing the first stages of the review process leading to submission of the results to scientific journals, and publication. Most recently, Dr. Martinez is leading a group evaluating the performances of a novel timing detector system that is part of an ambitious upgrade programme that will prepare CMS for a decade of operations at the High-Luminosity LHC.

In large collaborations in high energy physics, the experience and leadership of individuals is recognized by selecting them for coordinating roles as described above. Credit is given to members of the collaboration also via the attribution of talks at conferences, where they are representing the experiment. Dr. Martinez was chosen by the CMS collaboration to present physics results in some of the most important conferences in the field, such as the “International conference on high energy physics” in 2012 and 2014.

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In summary I can say that Dr. Martinez has shown a steady evolution in his scientific career, with several important contributions to the research programme of the CMS collaboration. He has increasingly taken leadership in different groups and guided many younger members of the collaboration. Therefore, I would like to express my strong support for his application for membership in in the Young Academy of Spain.

Sincerely yours,

Wolfgang Adam

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