



SANTA CRUZ
INSTITUTE FOR PARTICLE PHYSICS

SANTA CRUZ, CA 95064
June 6th, 2017

To Whom It May Concern:

Re: Recommendation for Marco Mandurrino for receipt of one of the INFN awards
“Funding for six projects presented by young researchers”

This is to recommend Marco Mandurrino for an INFN “young researchers” award. I have worked with Marco in the last year on the development low-gain avalanche Detectors (LGAD). In my position as member of the ATLAS collaboration, where I am responsible for the development of LGAD sensors for the HGTD detector to be installed for the HL-LHC ATLAS upgrade, I have collaborated intensely in the past 5 years with INFN Torino on the research and development of LGAD sensors. Thanks to the R&D collaboration between UC Santa Cruz and INFN Torino have, LGAD are now considered in the upgrade of both CMS and ATLAS.

The LGAD design can still be improved: two important fundamental aspects are the radiation hardness (i.e. where in a HLC detector one can placed LGAD so that they can survive the increased radiation level at the HL-LHC) and the fill factor (i.e. how efficient are the LGAD and how many layers does one need to guarantee 100% coverage).

At the core of Marco’s proposal is a simplification of the LGAD design which addresses directly the fill factor aspect by reducing the dead space between the pads, the active elements of the detector. In addition, it also can improve the LGAD radiation hardness as the gain layer will be more uniform and more adaptable to advanced doping options.

I strongly support this R&D, and I am looking forward to a continuing collaboration with an enlarged Torino group.

In my judgement, Marco Mandurrino will be a perfect leader of this important advancement in the development of 4D tracking, as he has shown in his detailed proposal of high scientific value.

Sincerely

A handwritten signature in black ink, appearing to read "Hartmut".

Hartmut F.-W. Sadrozinski
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