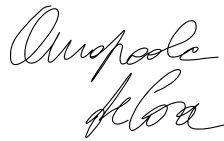


To whom it may concern,

This document certifies that **Dr. Pablo Martínez Ruiz del Árbol** gave the “**Experimental Particle and Astro-Particle Physics Seminar**” at the **University of Zürich** with title: “**Muon Tomography**” on the 27th of May of 2019.

In Zürich, on the 28th of May of 2019,

A handwritten signature in black ink, appearing to read 'Annapaola De Cosa', written in a cursive style.

Annapaola De Cosa

(Organizer of the seminar)

		<p>to complement your answers.</p> <p>Its target activity of 300 Bq/detector poses serious experimental challenges both in detector and readout performance.</p> <p>I will try to give an overview of the neutrino mass searches, focusing on the direct mass measurements with HOLMES and other competitor experiments.</p>		
27 May	Pablo Martinez Ruiz Del Arbol (ICFA, SPain)	<p>Muon Tomography</p> <p>The Earth is being constantly bombarded by high energy protons interacting with the atmosphere and producing a flux of 10000 muons per minute and squared meter. These muons interact with matter through ionization and multiple scattering being these processes highly dependent on the properties of the material they are crossing. The measurement of the attenuation and angular deviation of the muons can be used to infer the geometry and densities of the materials. This new technique is being used nowadays in applications such as volcanology, archeology, civil engineering, security, nuclear industry and the heavy industry. In this context, Muon Systems emerged as a company to apply these principles to the industry, and more particularly to the preventive maintenance of critical industrial equipment such as pipes and cauldrons. After working during 2 years in the development of suitable muon detectors and algorithms, the company will start its first pilot project measuring the thickness of pipes in a petrol processing factory in the north of Spain. This seminar will review the principles of muon tomography, its applications and how it can be used to improve several industrial processes.</p>	<p>↓ talk (PDF, 12179 KB)</p>	Annapaola de Cosa

→ Directions	Contact: Alison.Mitchell@physik.uzh.ch	↓ Room Connection Instructions (PDF, 3950 KB)
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