Renormalization of mixing matrices is still a rather open question in particle physics. Previously, we have devised a renormalization scheme which satisfies all the mixing renormalization requirements (UV finiteness, gauge-independence, etc.) trivially. In this presentation we showcase our renormalization scheme of mixing matrices by computing the hadronic W decay widths in the Standard model with a trivial CKM mixing matrix counterterm. We also present *preliminary* numerical results comparing our scheme with other schemes found in the literature.

Type of contribution:

Talk

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Development of Gas Electron Multiplier Detector System for High-Resolution X-Ray Imaging

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In this study, a fully integrated Gas Electron Multiplier (GEM) detector system was employed for high-resolution X-ray imaging. The detector is based on a triple-GEM foil configuration, each with an active area of 10×10cm^2, housed within a sealed gas chamber. The GEM foils are fabricated from copper foil, featuring a dense array of microscopic holes that enable avalanche multiplication of electrons under high voltage. The triple-GEM cascade ensures high gain, low ion feedback, and excellent spatial resolution.

The detector includes a Kapton window, a drift cathode that establishes a uniform electric field across the drift region, guiding primary ionization electrons toward the GEM stack. The multiplied electrons are collected on a 2D readout plate with 256 channels (128 in X and 128 in Y), enabling precise spatial localization of the incident radiation. The readout system is a custom-designed 256-channel board developed by Techtra, interfacing with the GEM detector via four Panasonic® connectors. It integrates four Texas Instruments® DDC264 analog-to-digital converters (ADCs), each offering 64 channels with 20-bit resolution and current-input capability.

The detector operates with an Ar/CO_2 (70/30) gas mixture and is powered by a high-voltage supply unit (Caen DT5470N USB HV PS), capable of delivering up to −5kV at 200μA. High-voltage is supplied to the GEM foils via a dedicated HV connector and cable. Gas flow is regulated using a Micromite 1656M4YA dosing valve with micrometric control. The system is housed with dedicated connectors for inputs and outputs, ensuring stable and low-noise operation.

To demonstrate the imaging capabilities of the GEM detector, a COOL-X miniature X-ray generator was used. Random objects were placed on the Kapton entrance window and irradiated with X-rays. The COOL-X uses a pyroelectric crystal to generate electrons, which then produce X-rays upon striking a copper target, with peak output reaching approximately 10^8 photons per second and endpoint energies up to 35kV.

Type of contribution:

Poster

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