

The design of a double stack MRPC for DMEG

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Overview

- **1. Introduction**
- 2. Strategy
- **3. Description of a double stack MRPC**
- 4. Construction
- 5. Summary



Introduction

1. About MRPC

- * used in many experiments with excellent timing performance
- * operating in a cosmic ray experiment, like Extreme Energy Events(EEE)
- * cover a large detection area at low cost
- * easy to build

2. Motivation of a double stack MRPC for DMEG project

- * to reduce the operating voltage using double stack
- * useful for the ecological gas mixtures (i.e. with $C_3F_4H_2$) that require higher operating voltages than the typical gas mixture (i.e. $C_2F_4H_2/SF_6$)



Strategy

1. Gas Tube

- * to improve the gas flow through gaps of the MRPC by adding small gas tubes.
- * The same length Teflon tubes(0.8 mm in diameter) are extended from input/output gas connectors and distributed along the edge at intervals.

2. 9mm wide copper tape

* allows a better position resolution

3. Two methods for readout

* test whether it was possible to mount a readout card at just one end of the chamber in a similar configuration



Description of a double stack MRPC

1. Schematic cross-section view of a double stack MRPC with

6 gaps (85 cm x 85 cm of sensitive area)





2. Schematic view of a double-ended readout MRPC





Description of a double stack MRPC

3. Schematic view of single-ended readout MRPC





Construction





 made by adhering 9 mm wide copper tape to vetronite panel on a 11 mm pitch



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Adding Teflon tube











Sealing with tape









Summary

1. New design of MRPC for DMEG project

- * to reduce the operating voltage, useful for the ecological gas mixtures
- * improve uniform and correct gas flow into the gap
- * for low consumption with a small gas volume

2. Strategy

- * Gas Tube : to add small Teflon tubes
- * 9mm wide copper tape : allows better position resolution
- * Two methods for readout : double or single-ended readout in a similar configuration

3. Beam test results

* Yongwook BAEK 's presentation

4. Next step

- * to Install PVC bar instead of sealing with tape to enhance sealing
- * make two more chambers and test with cosmic ray