



中国科学院大学

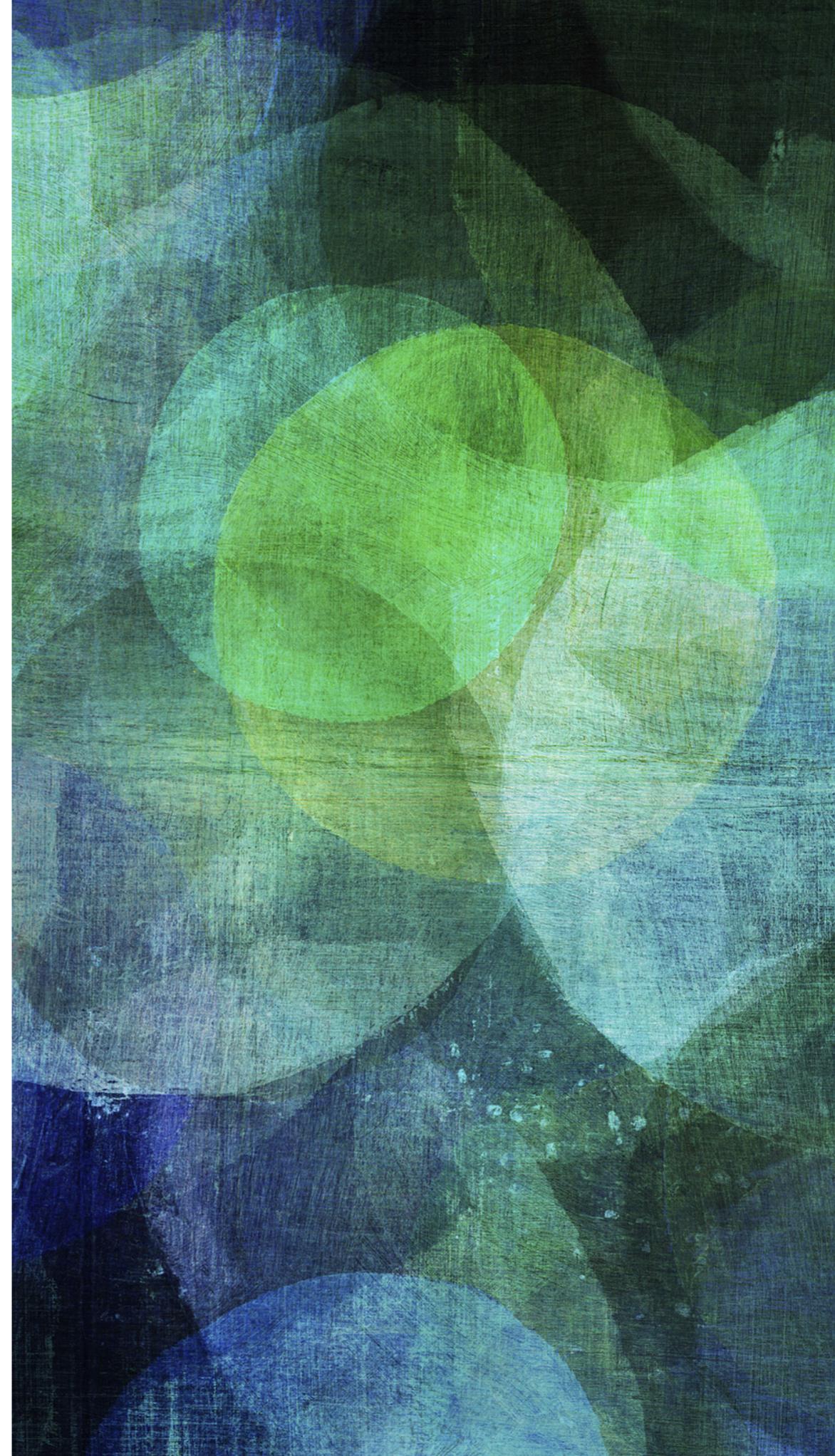
University of Chinese Academy of Sciences

UNIVERSITY OF CHINESE ACADEMY OF SCIENCES

WELL-THGEM & SEALED THGEM STUDIES

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中国科学技术大学, 合肥
2017-04-11

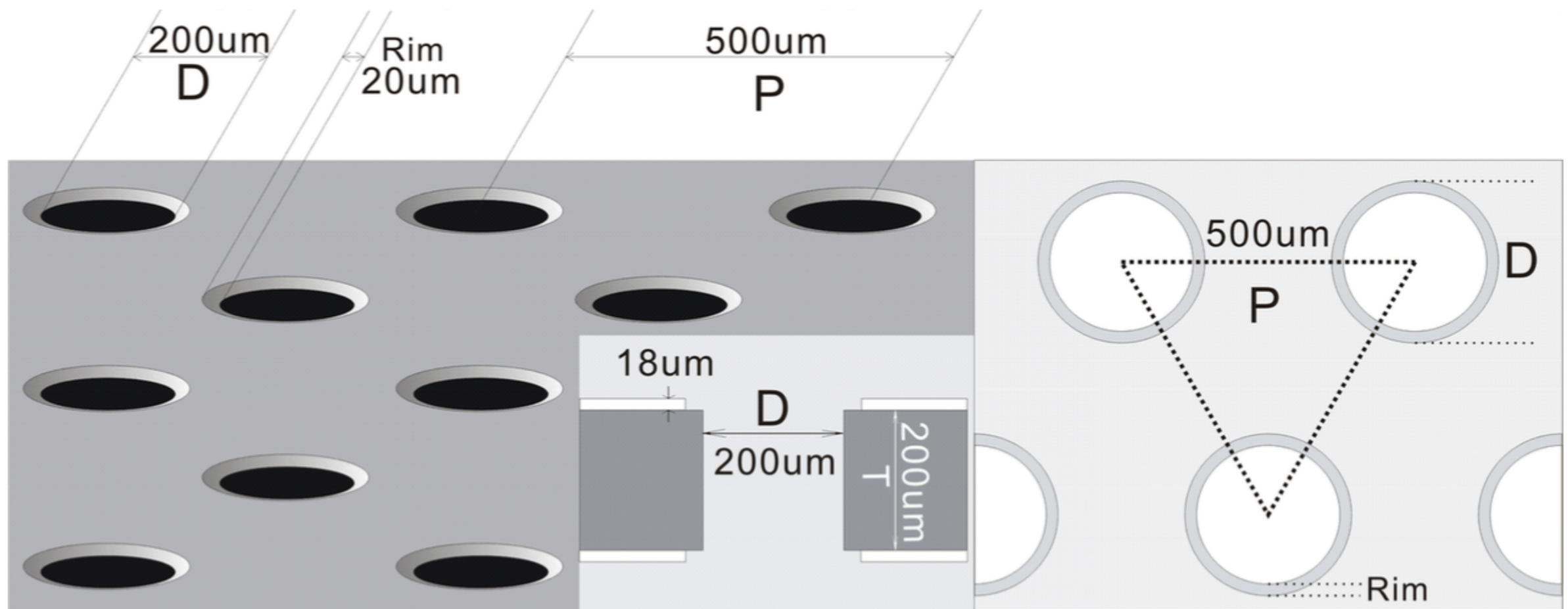


OUTLINE

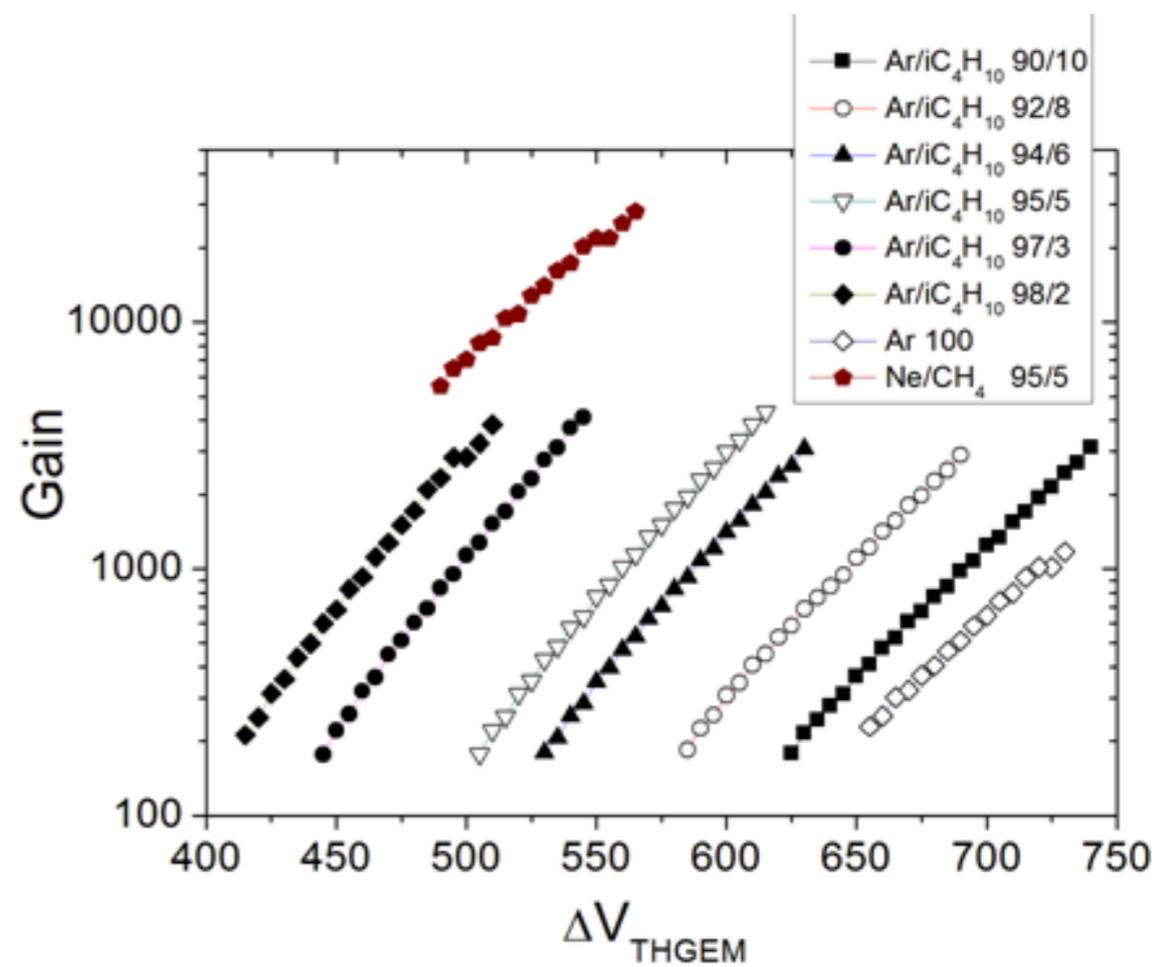
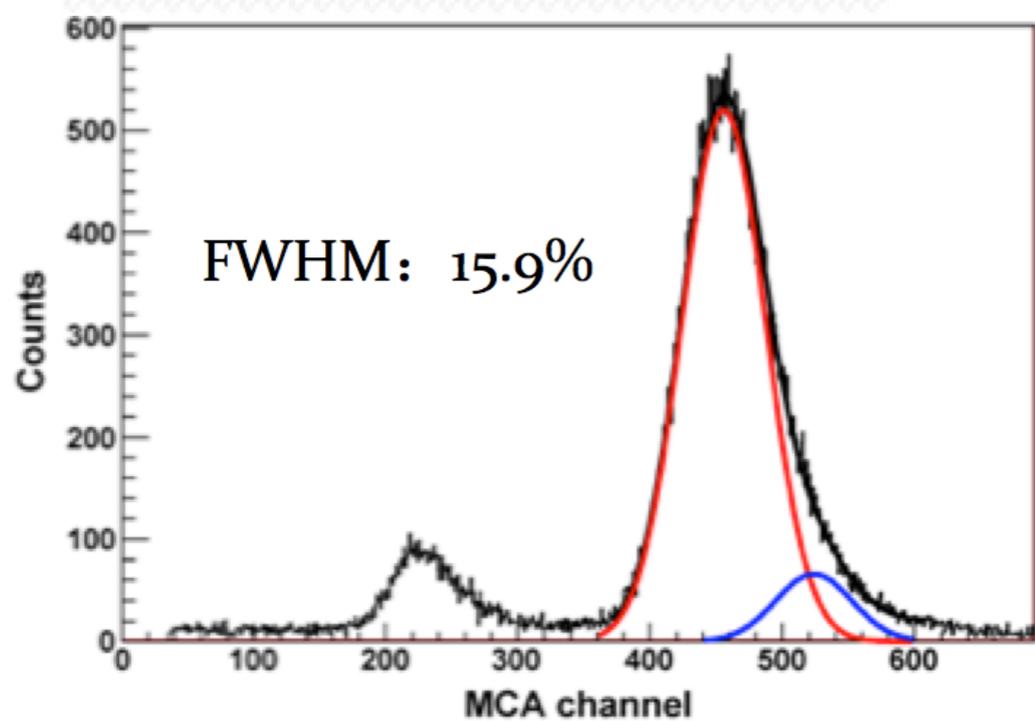
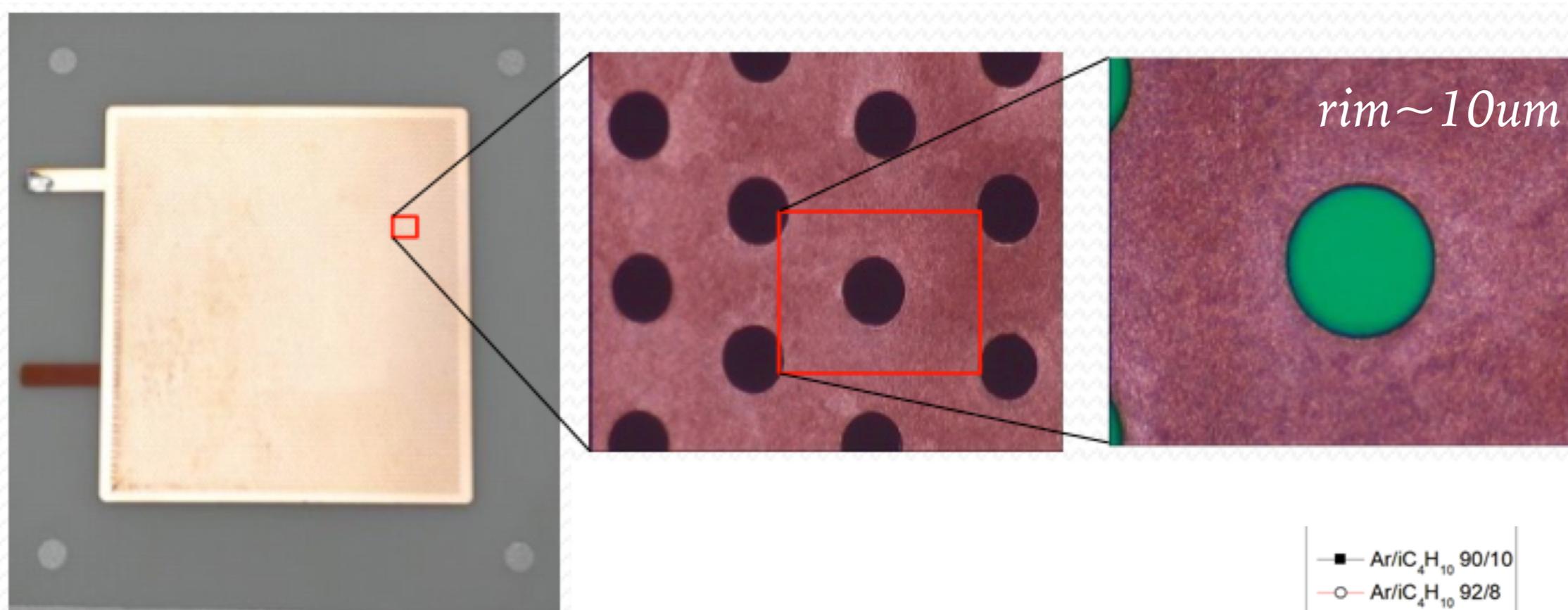
- 较薄的厚气体电子倍增器 (thinner-THGEM)
- 井型THGEM
 - 数字强子量能器
 - 小型THGEM样机的束流探测
- 密闭THGEM
 - 设计及性能测试
- 结论

THINNER—THGEM

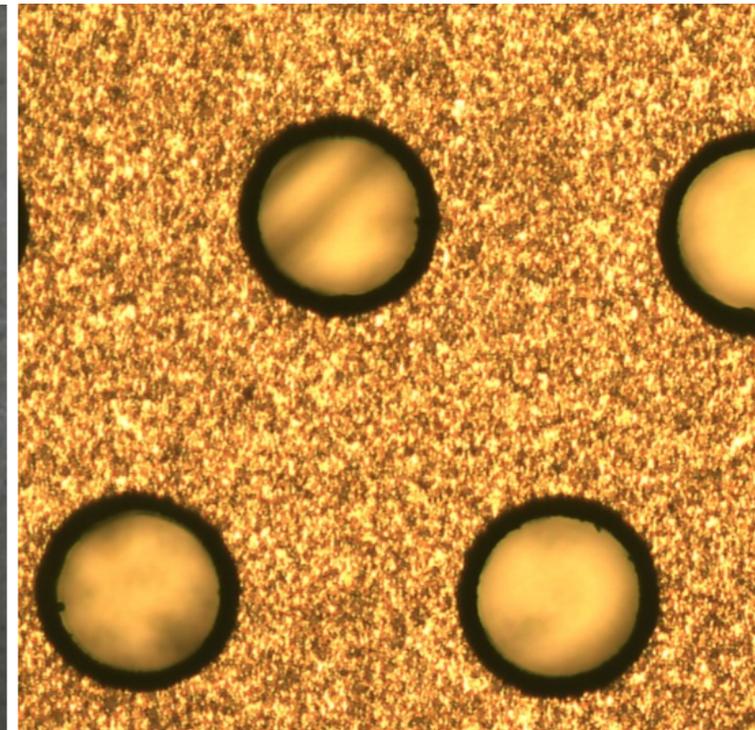
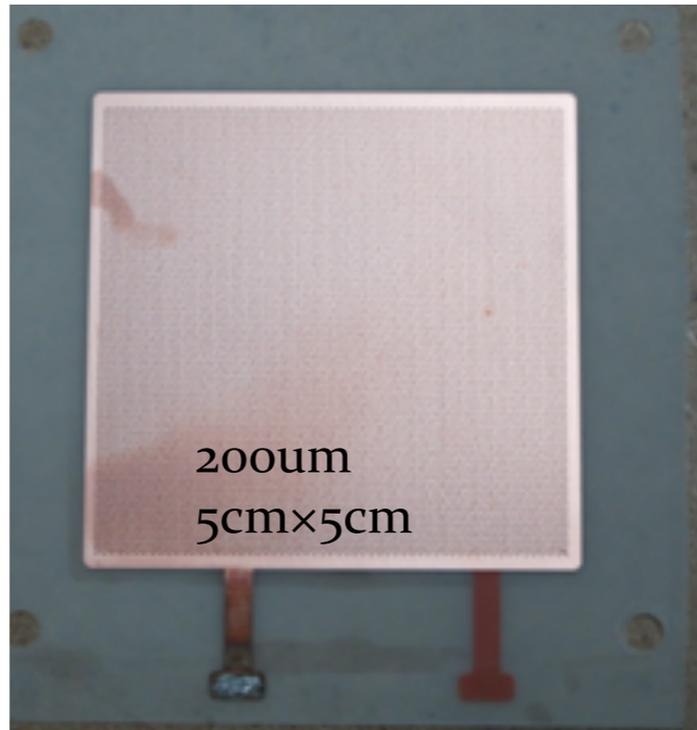
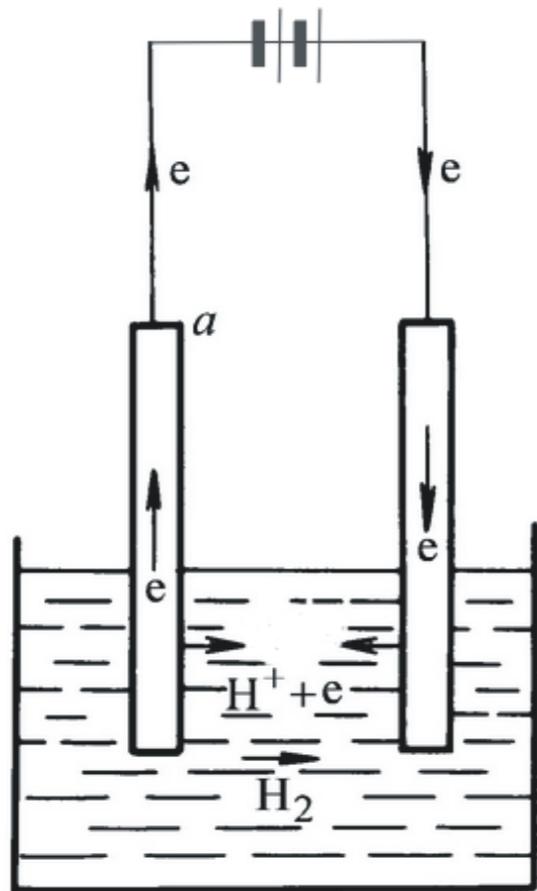
- 厚度在150um~200um
- 最小孔径100um, 孔间距200um
- 目前已经制作的规格多为150um/300um, 200um/500um



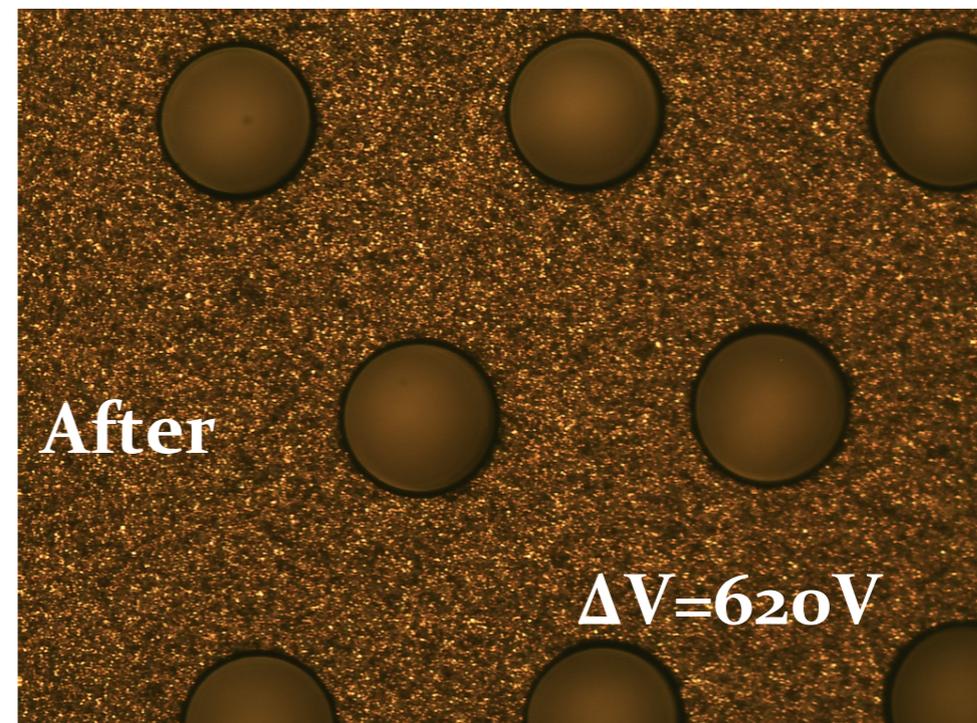
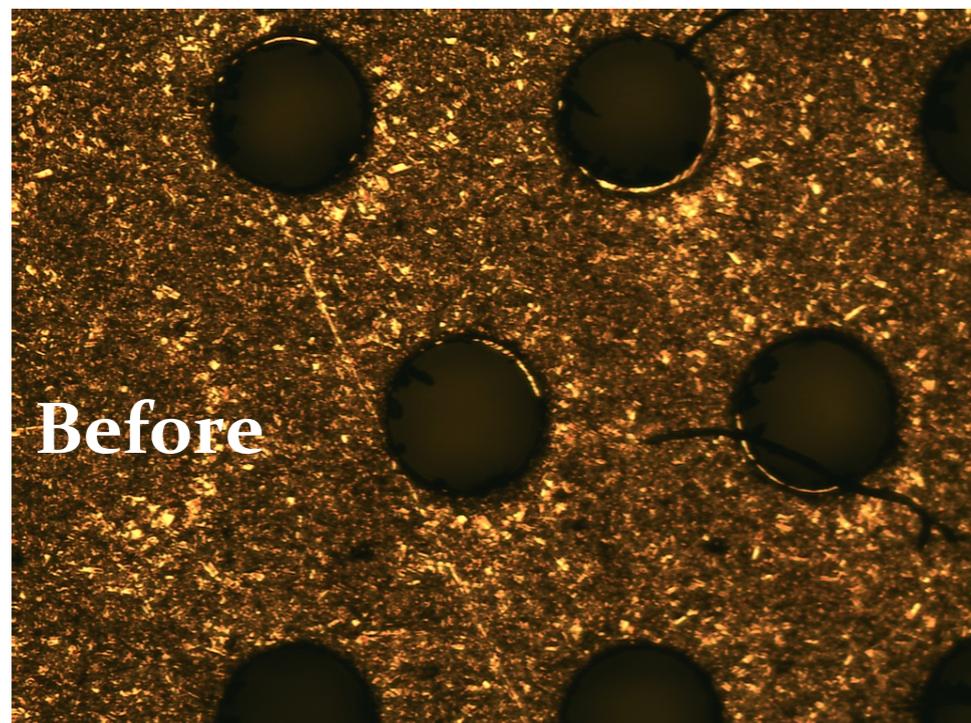
制作工艺 - 整版微蚀



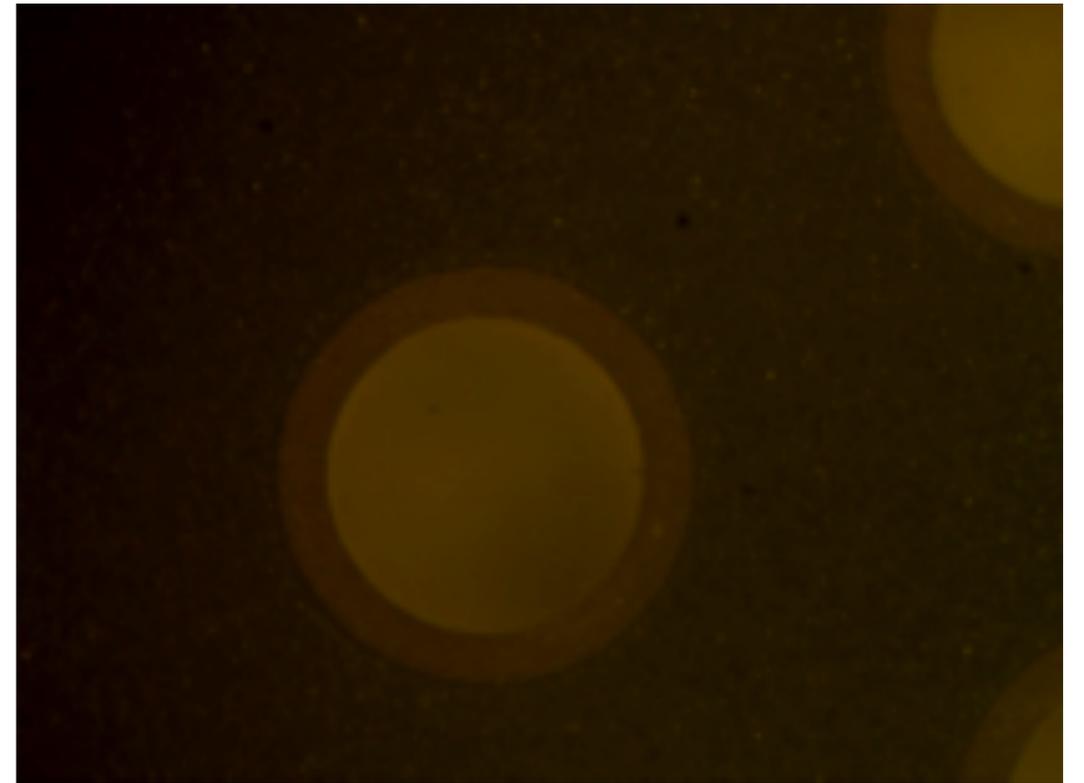
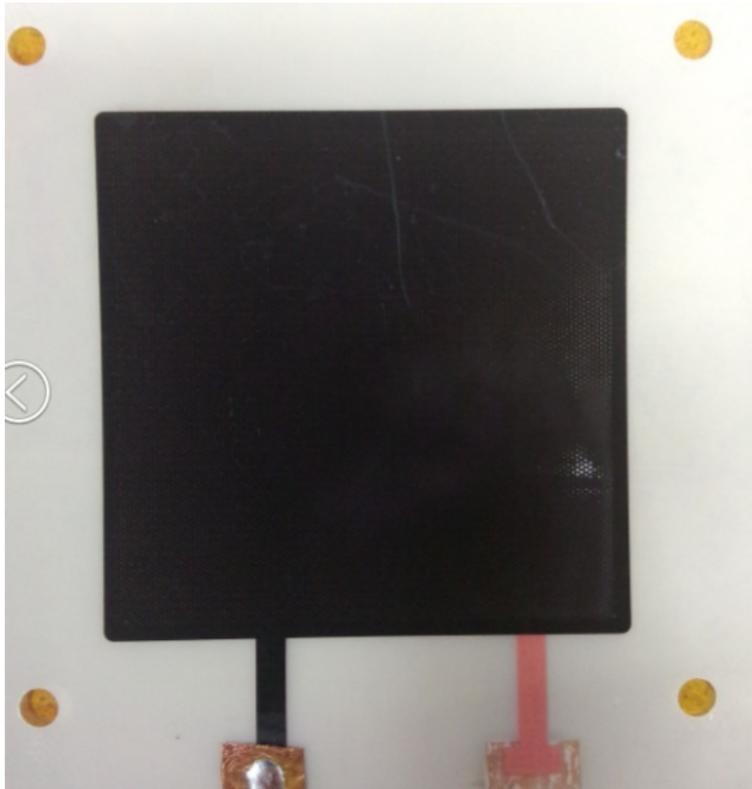
制作工艺 - 电化学



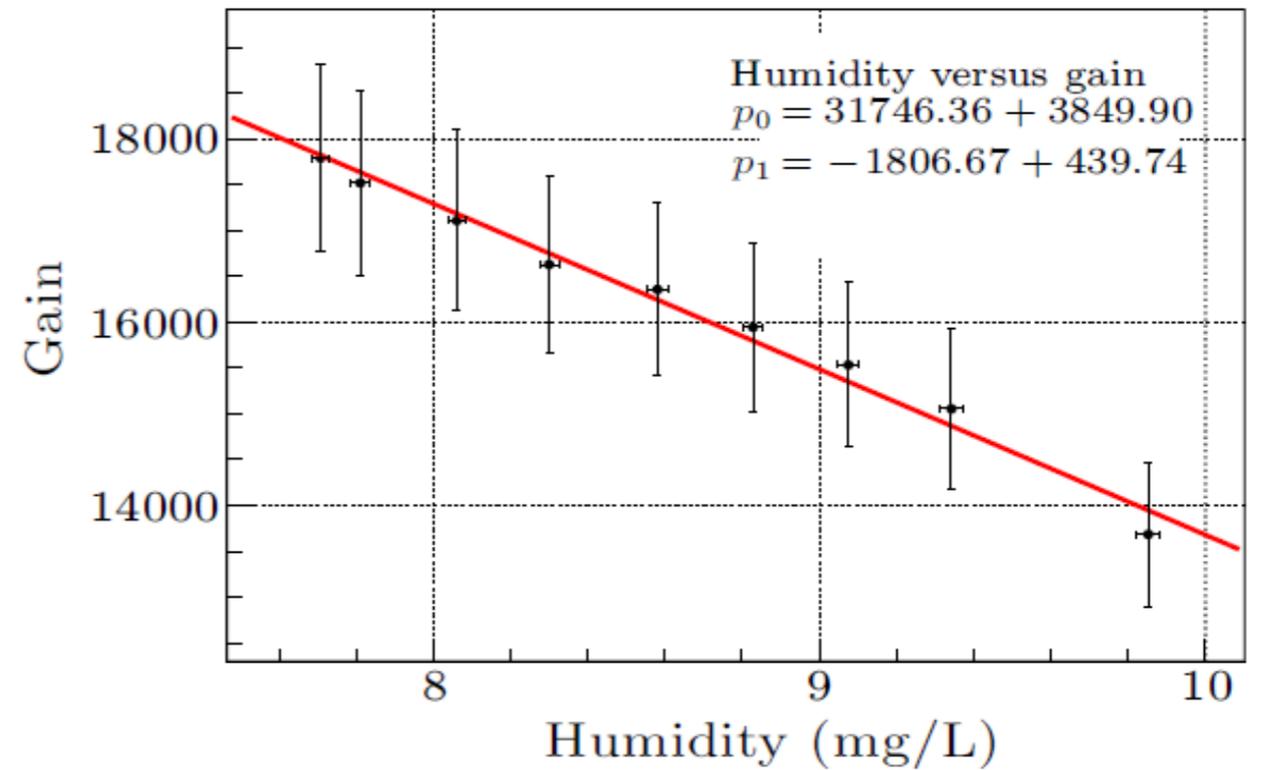
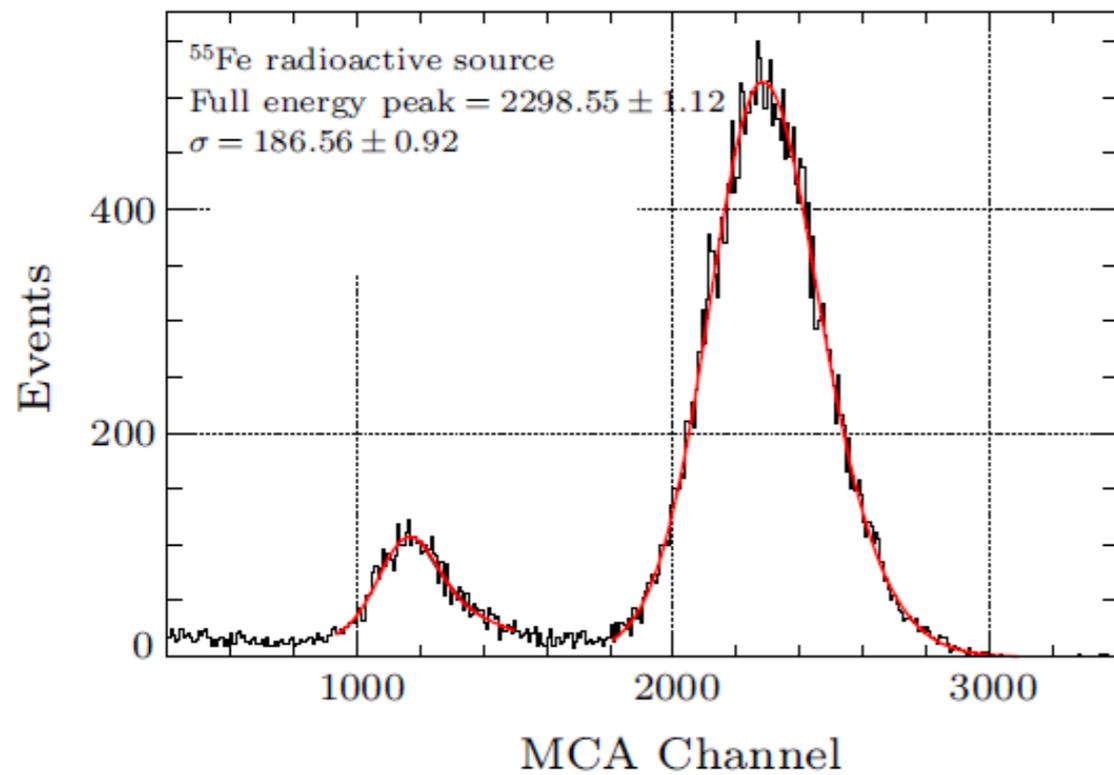
可控制 rim 的大小



制作工艺 - 阻性膜

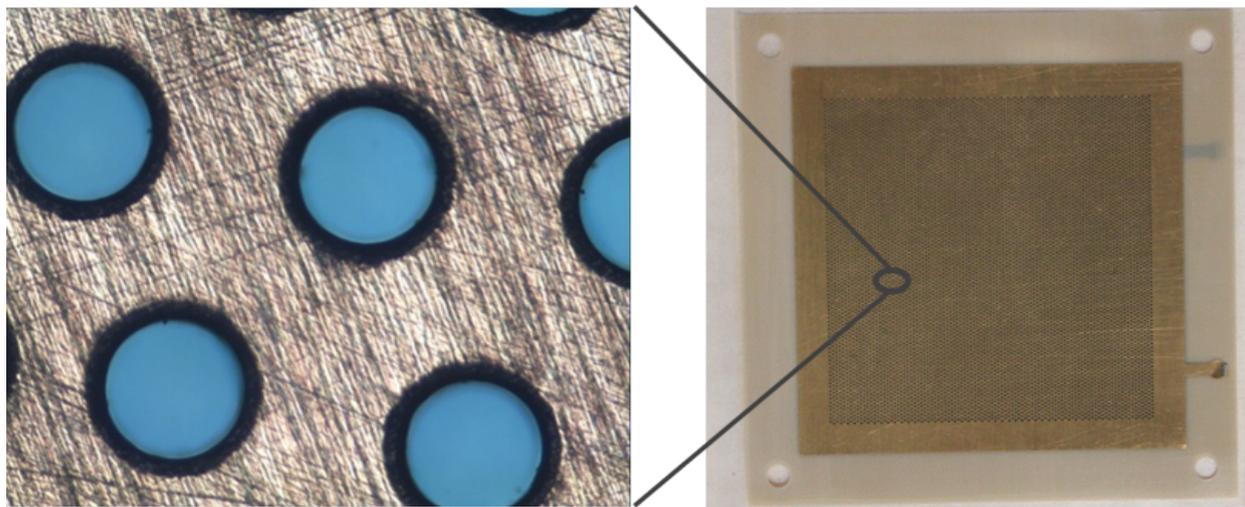
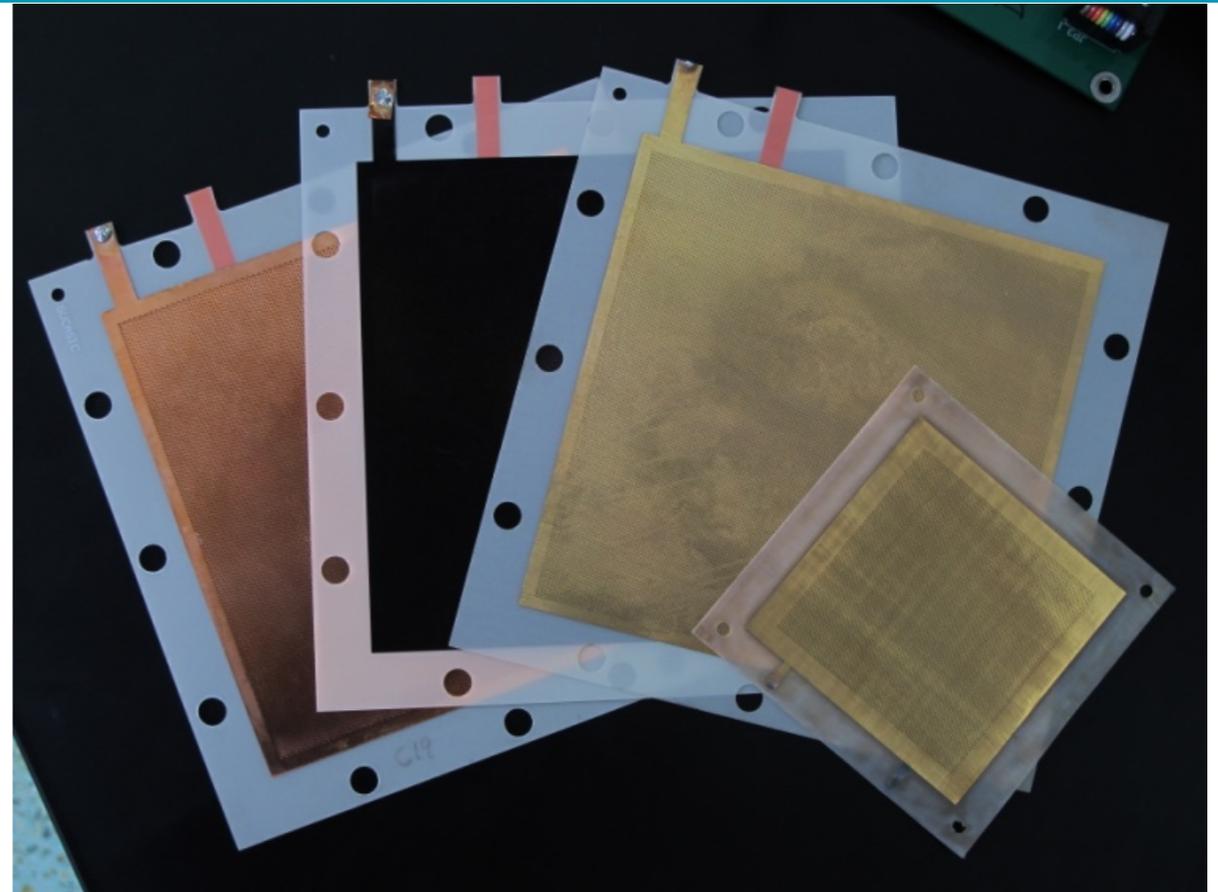


在较大的湿度下仍能工作

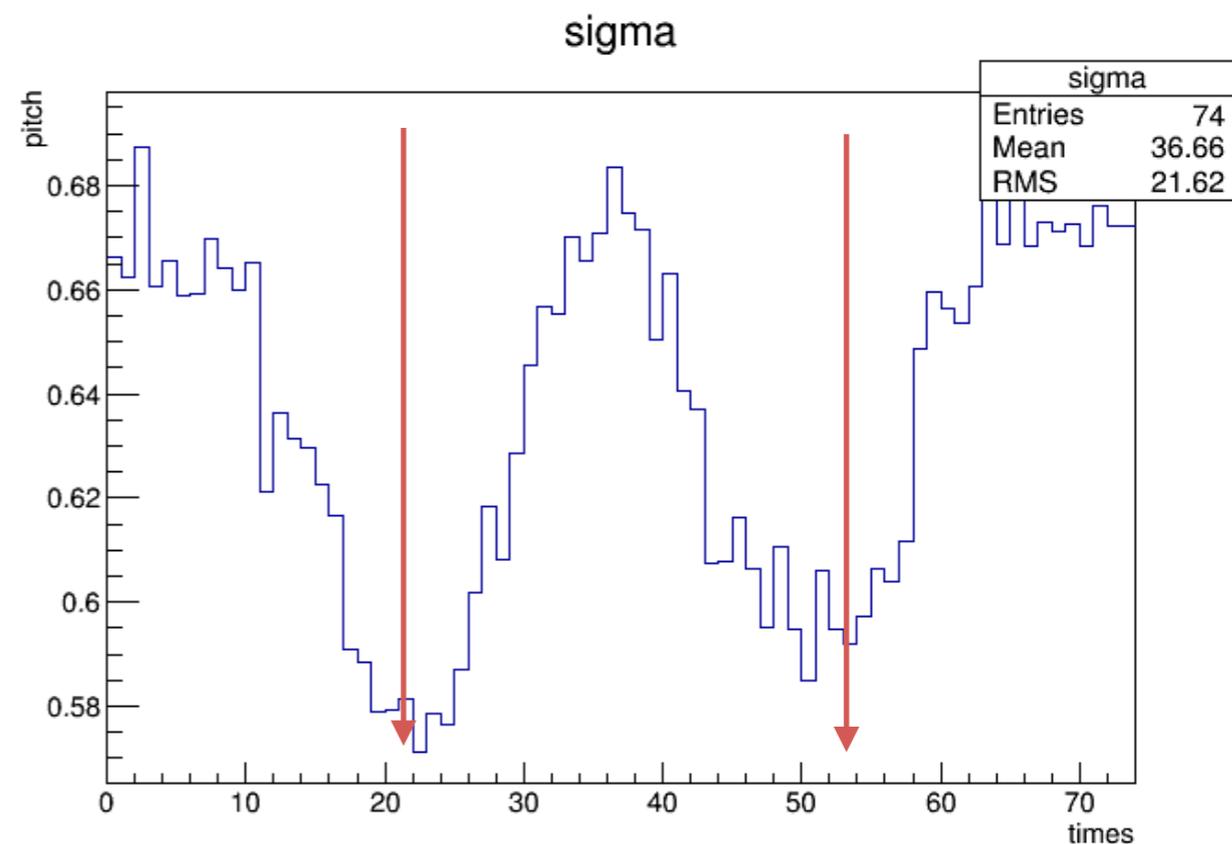
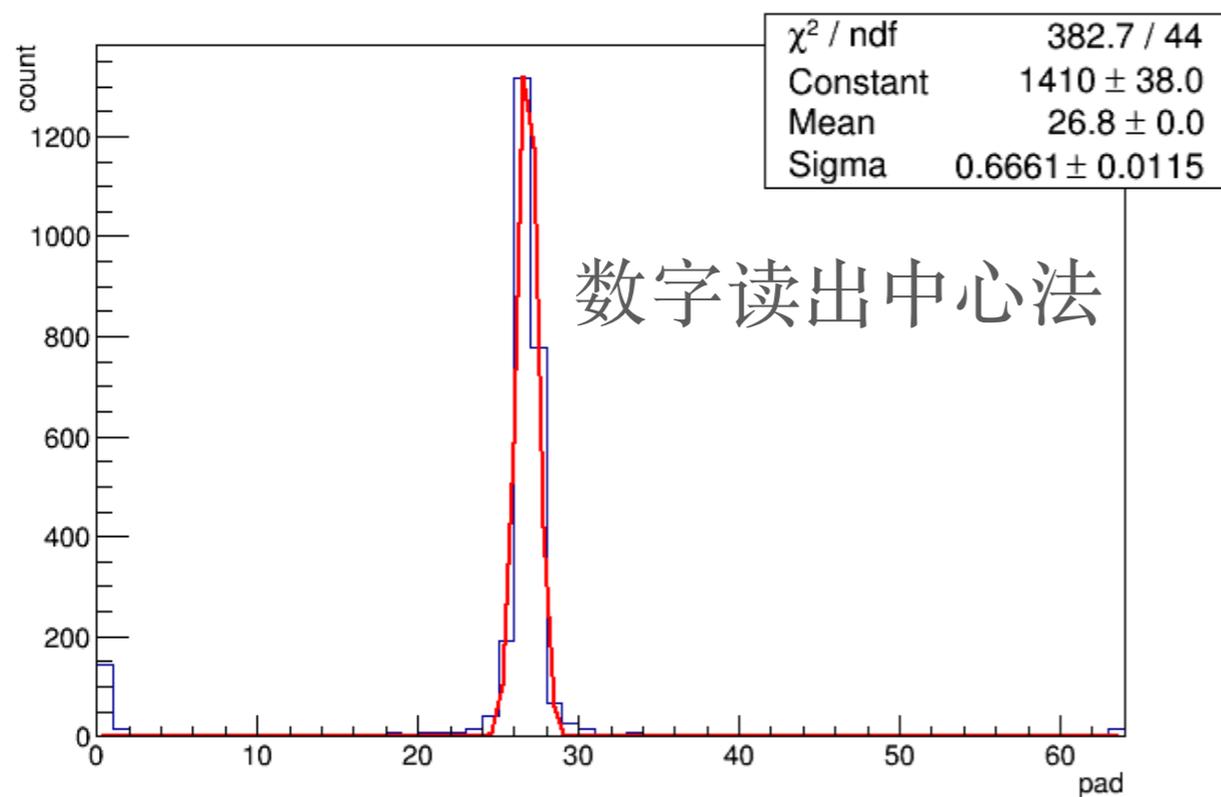
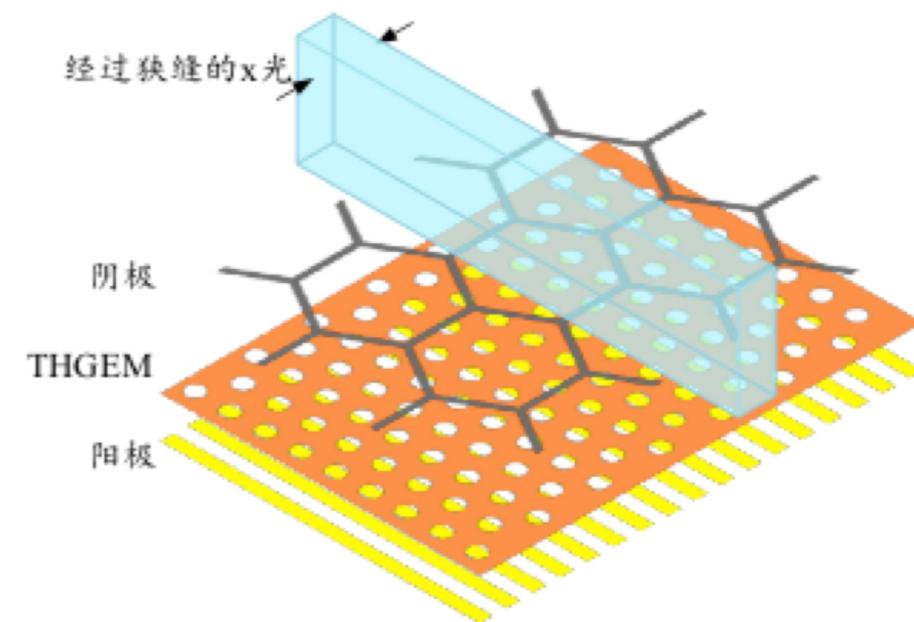
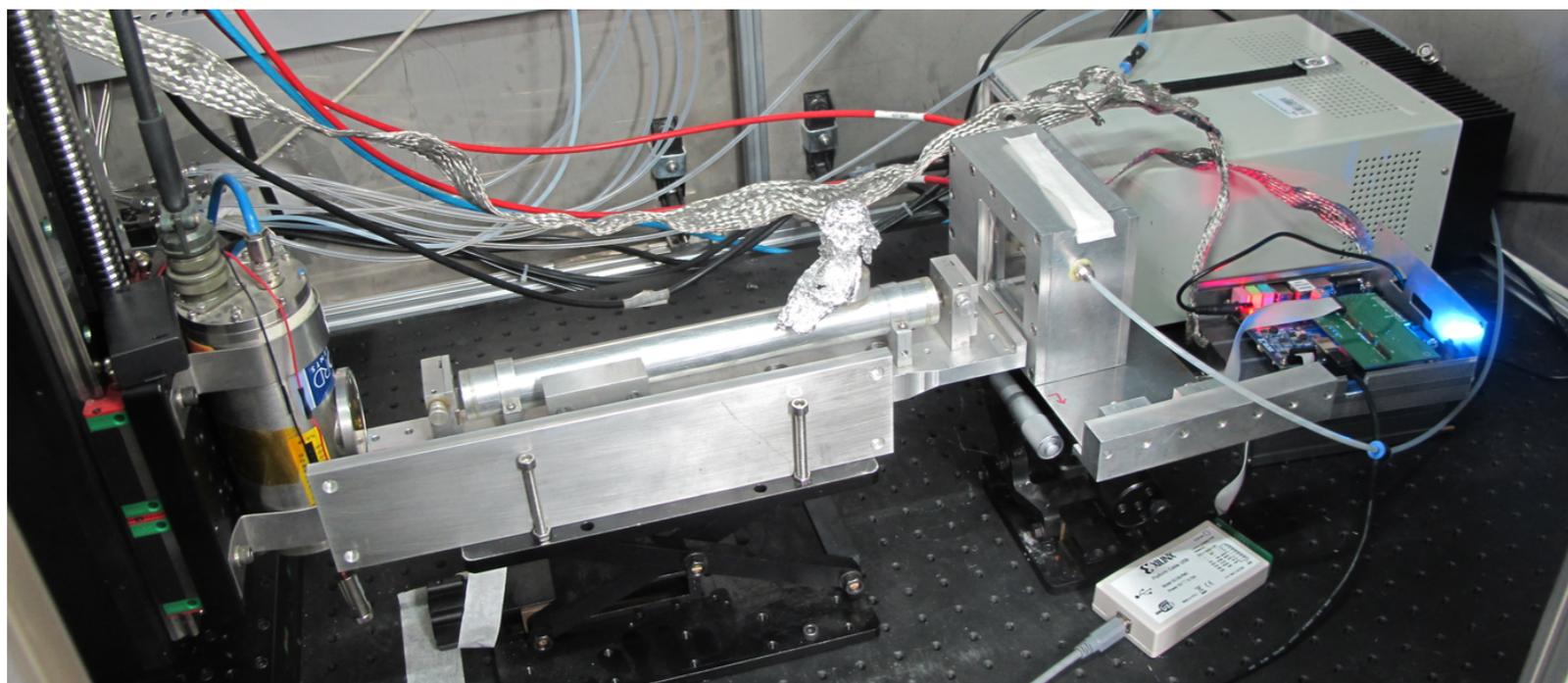


THGEM-制作工艺

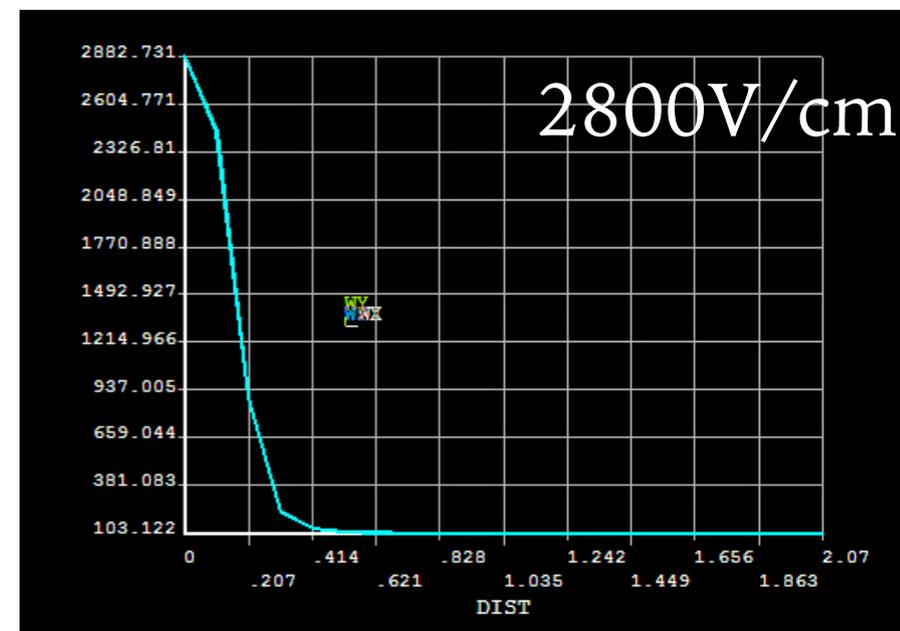
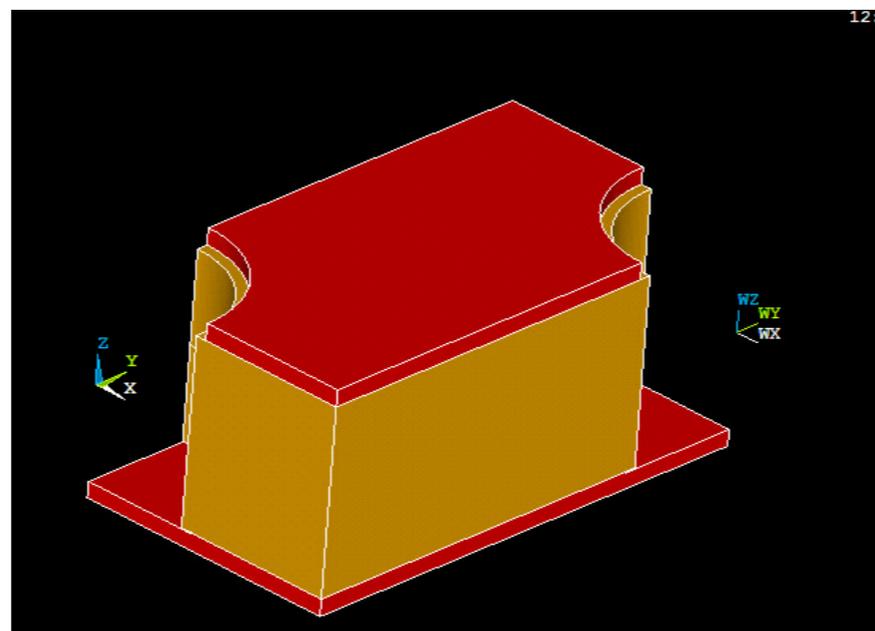
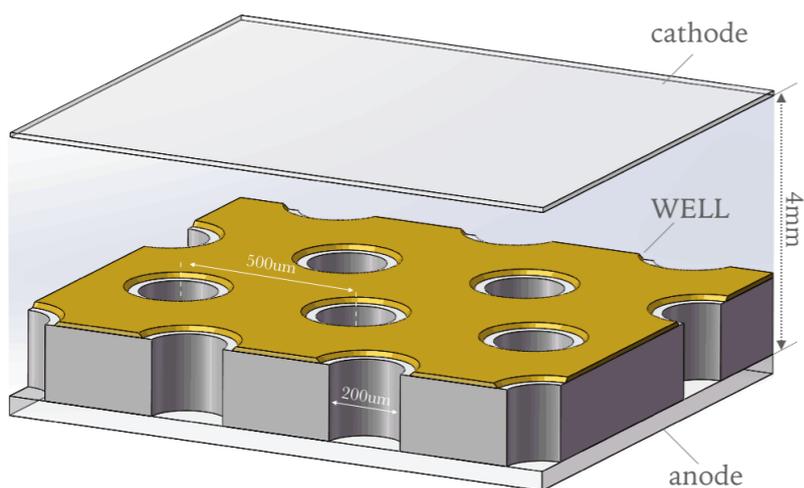
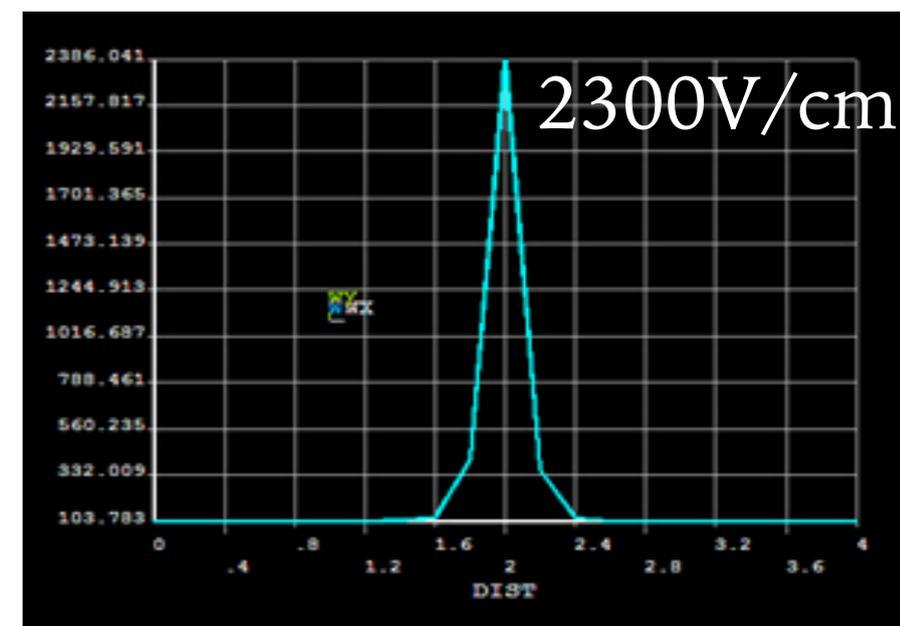
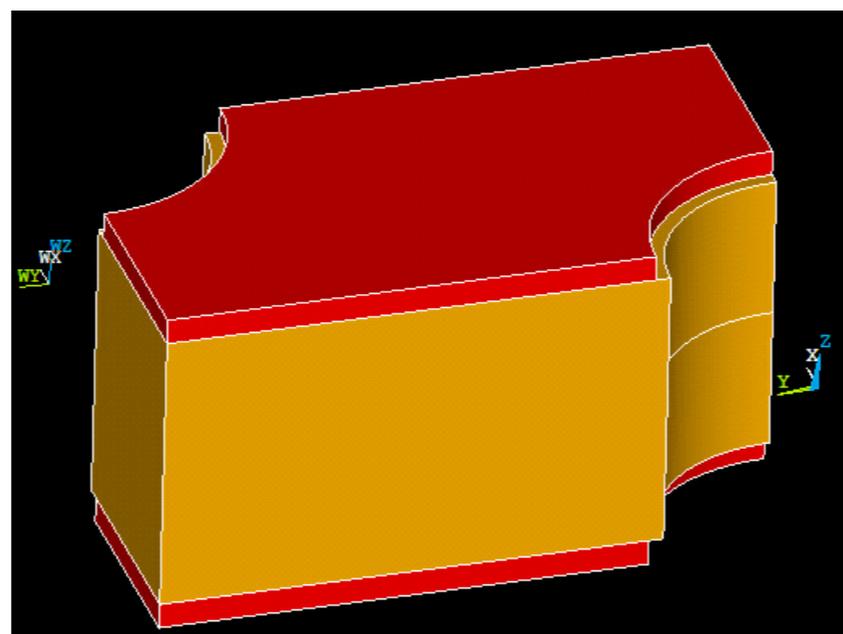
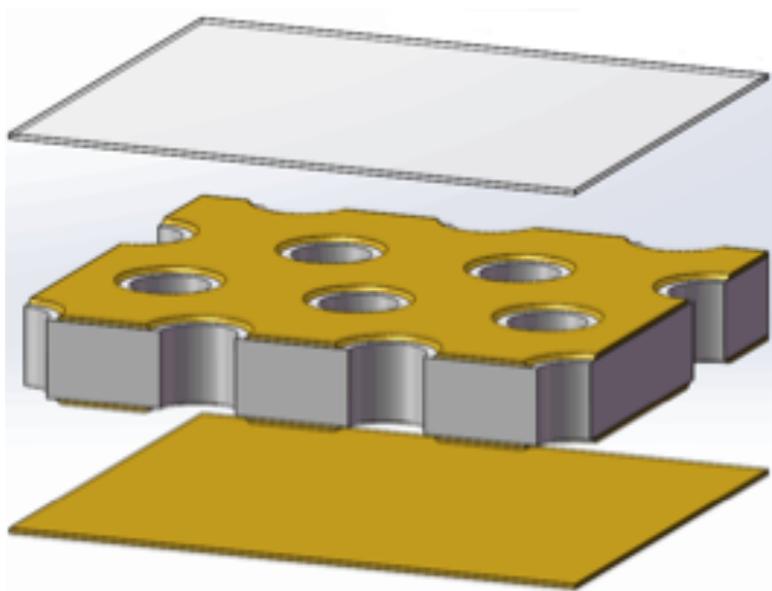
- 新材料
- 大面积



THINNER-THGEM空间分辨研究

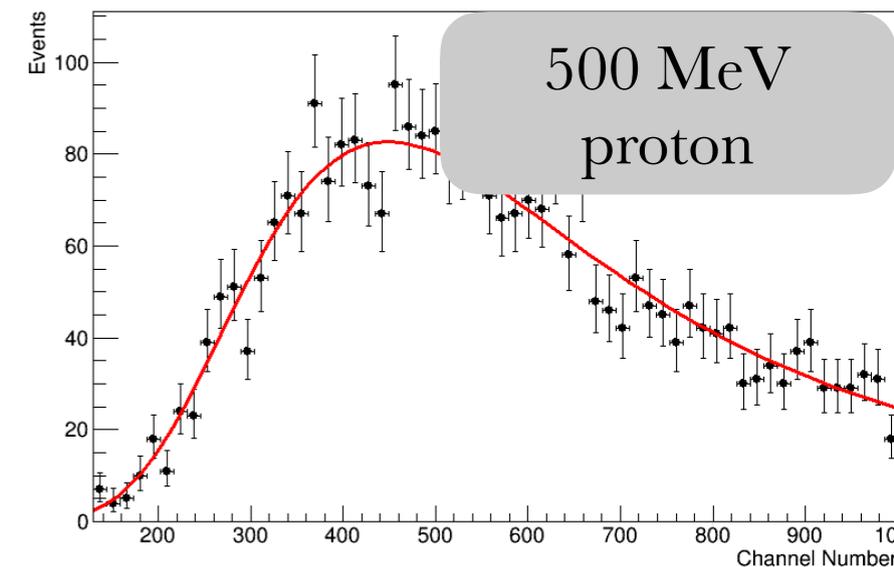
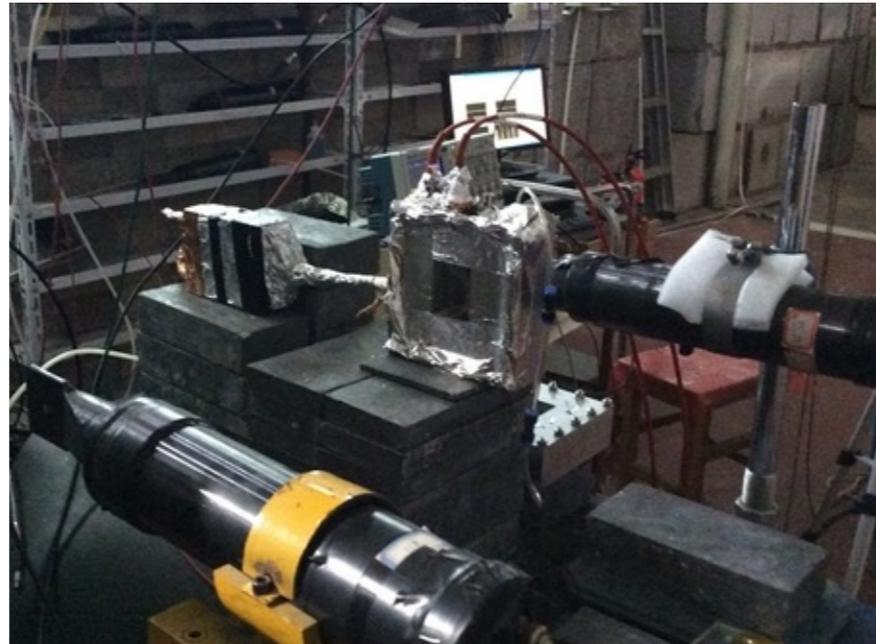
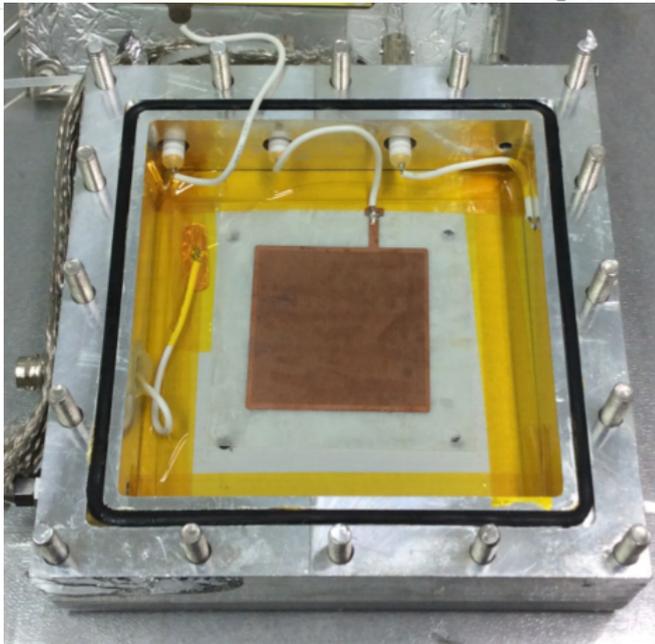
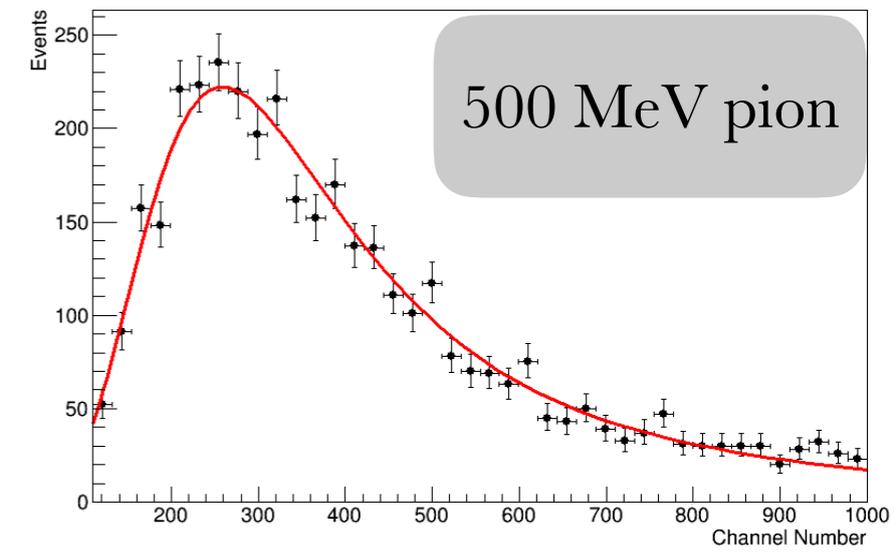
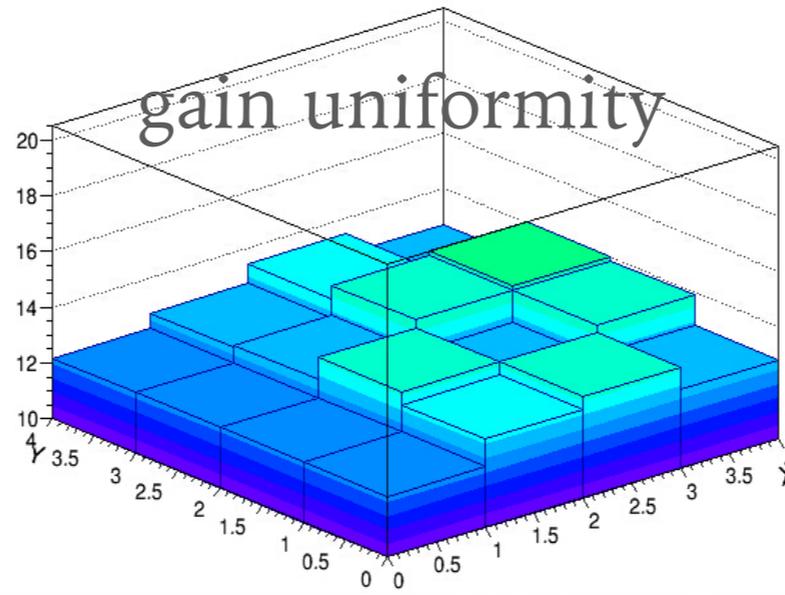
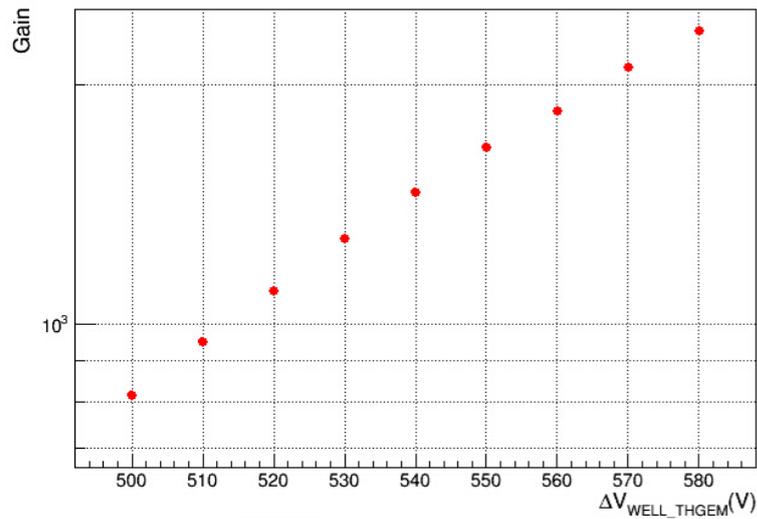


井型THGEM - 模拟



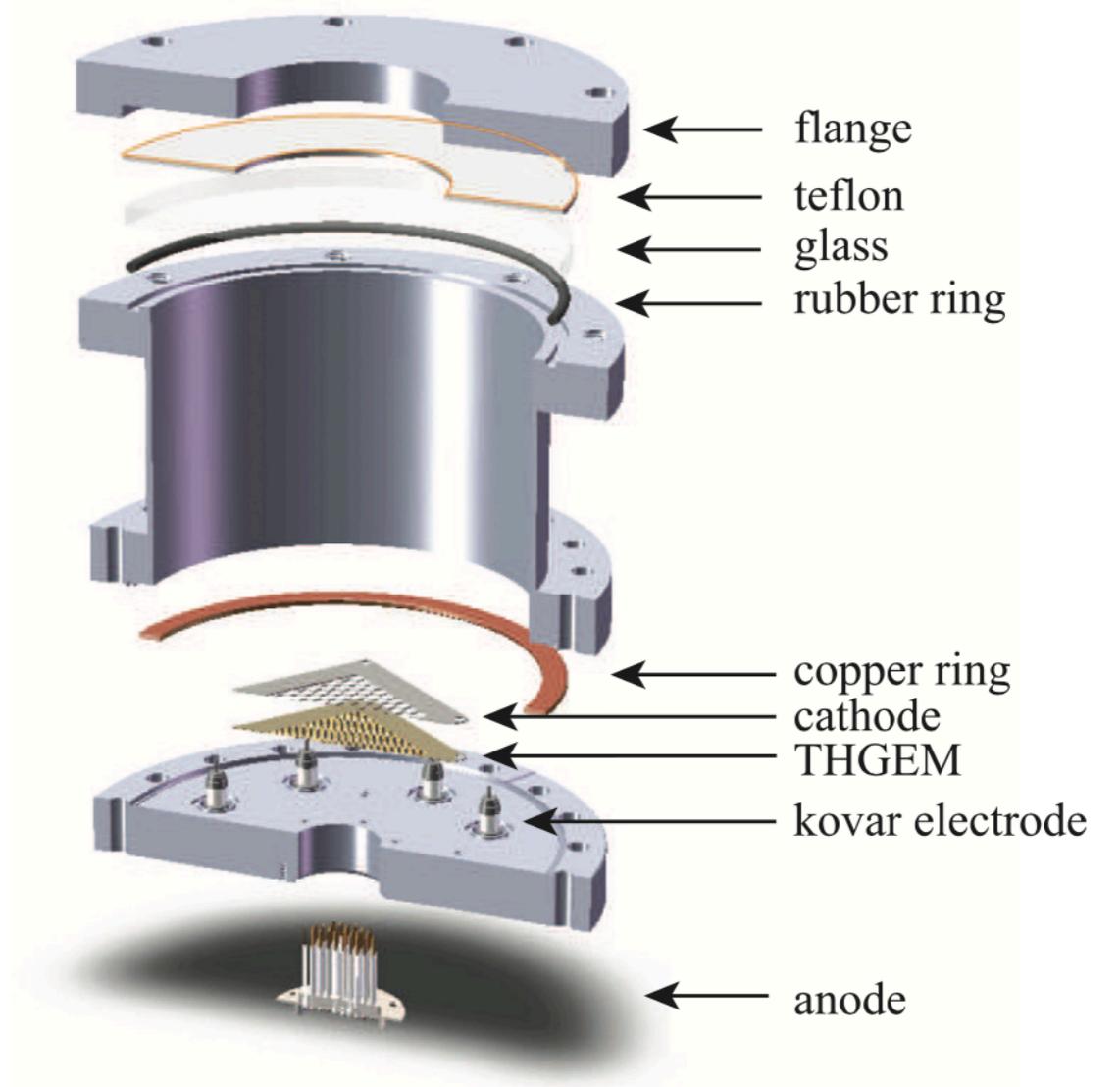
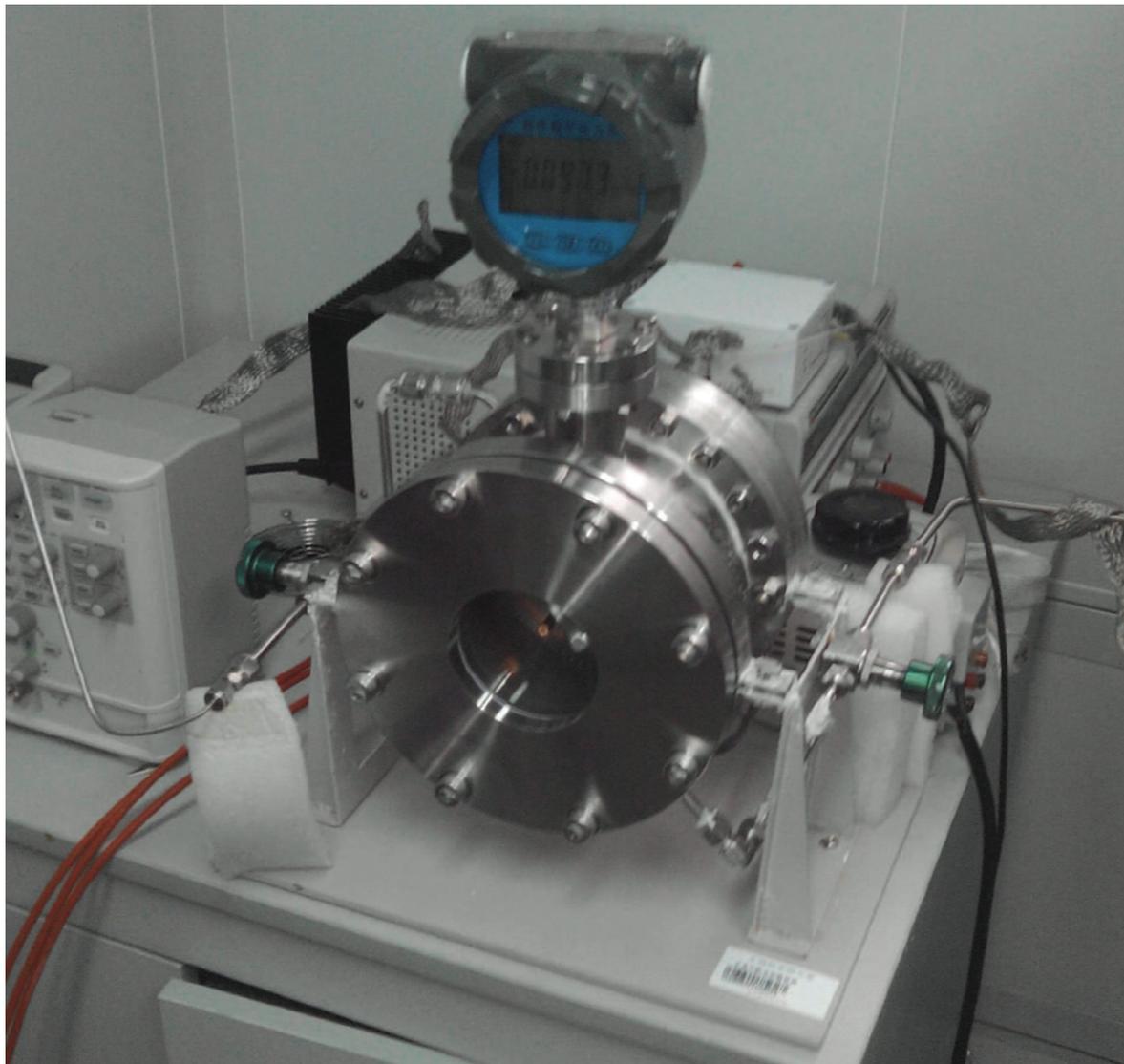
性能测试

- Ne/CH4 (95/5) ,Gain ~ 9000
- Eff (proton) > 99%; Eff(Pion) > 94%



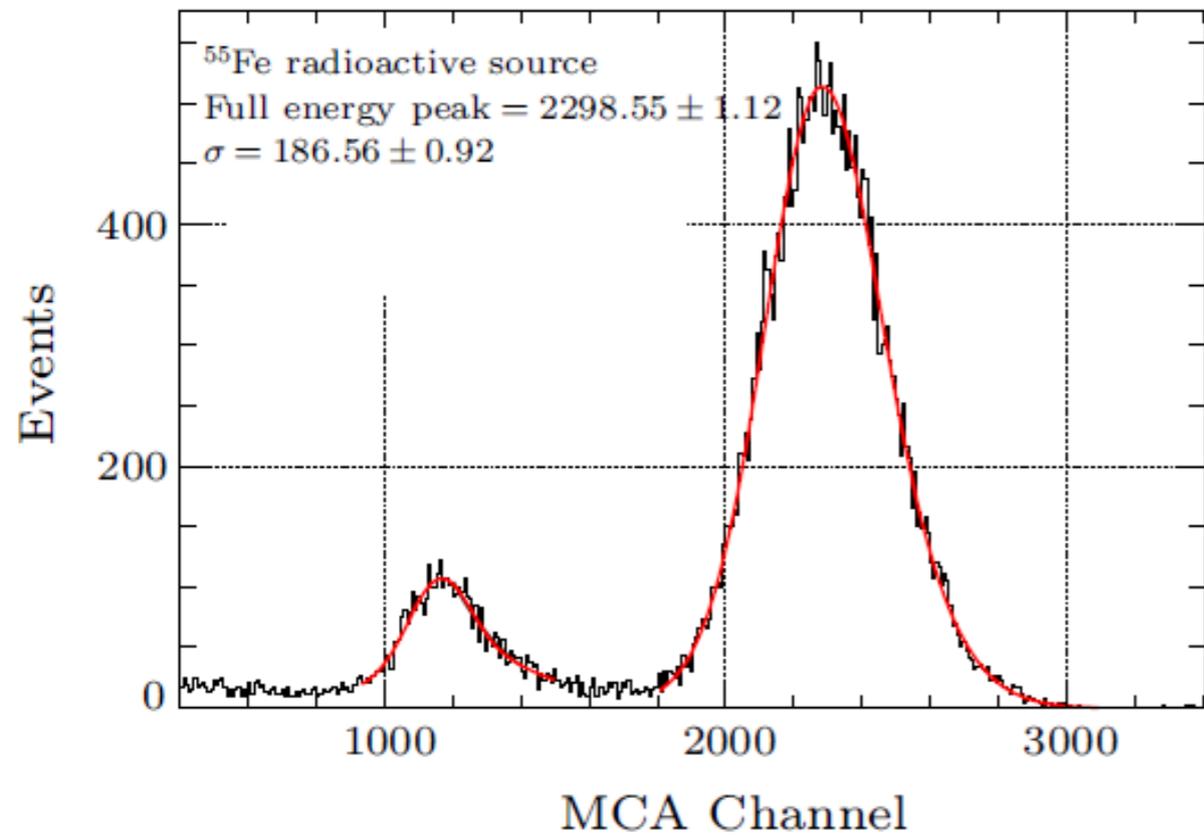
密闭THGEM

- ▶ Well-THGEM 结构紧凑，更容易实现密闭以方便应用
- ▶ 研究密闭情况下THGEM的工作情况

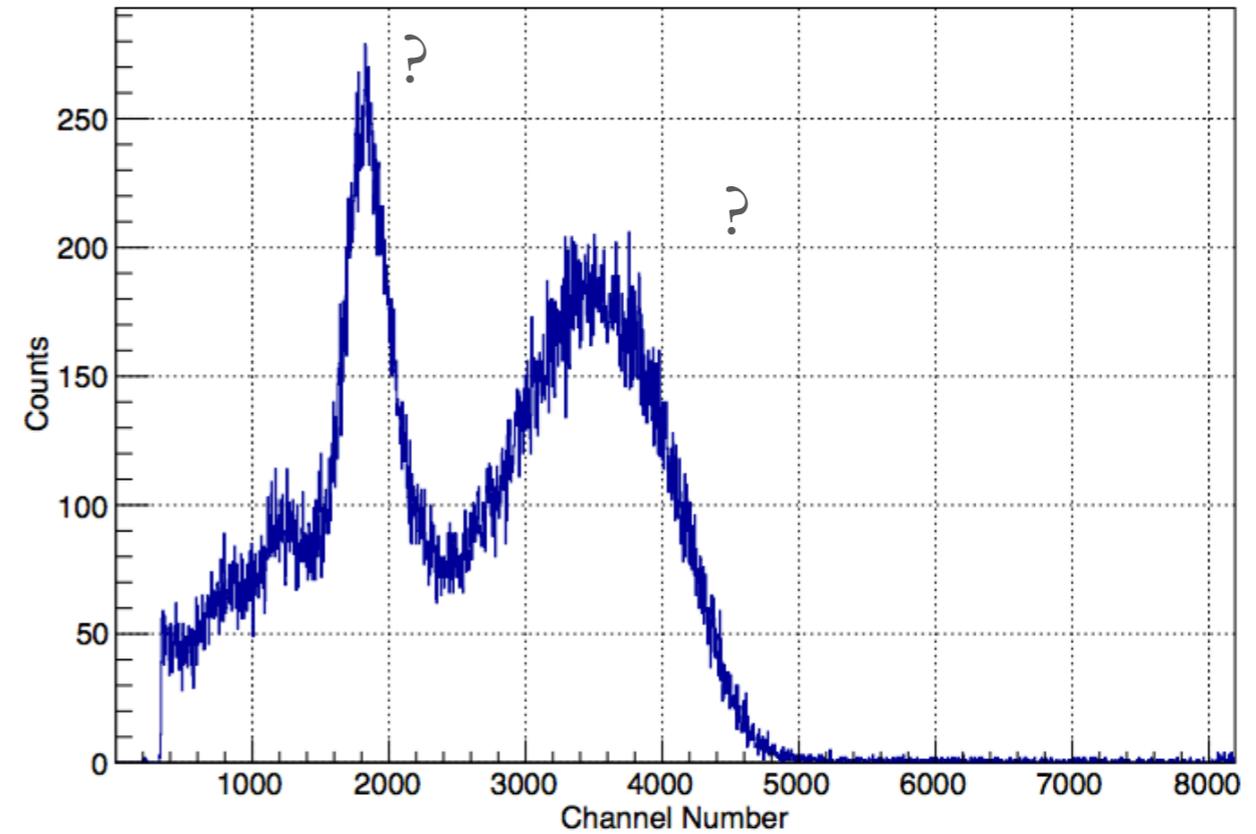


► X光响应

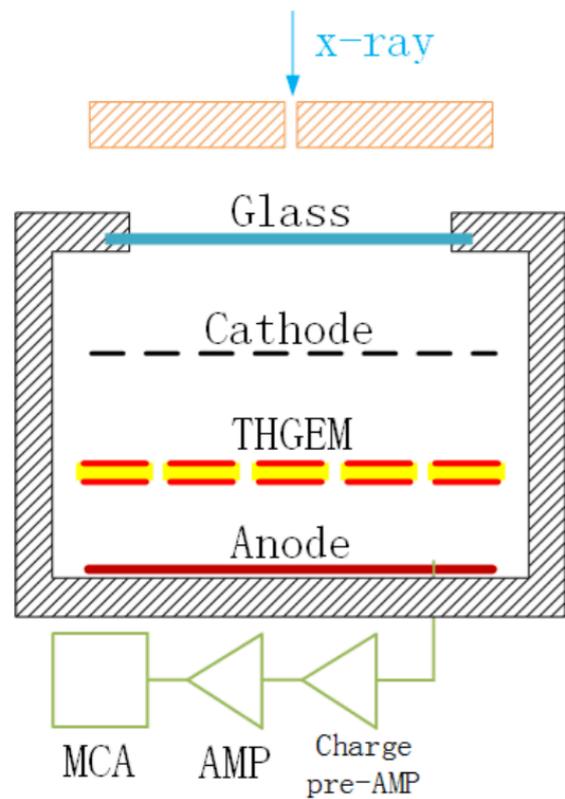
THGEM测得的X光响应



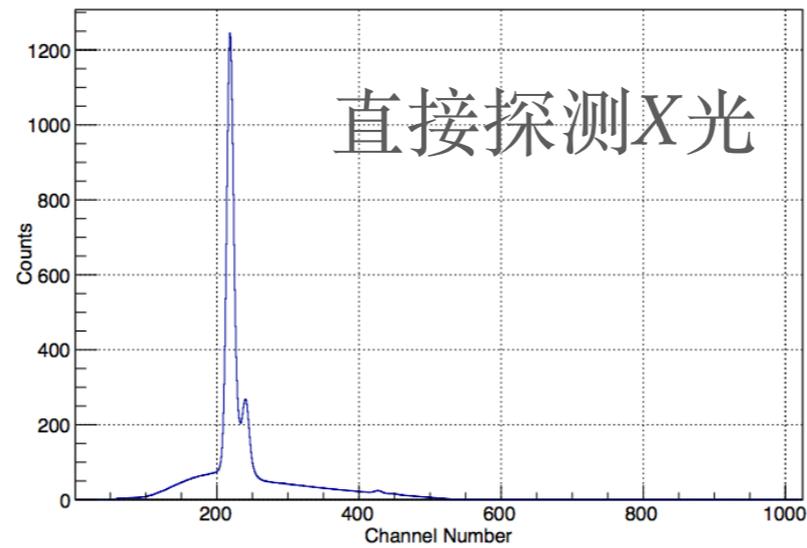
此密闭THGEM测得的X光响应



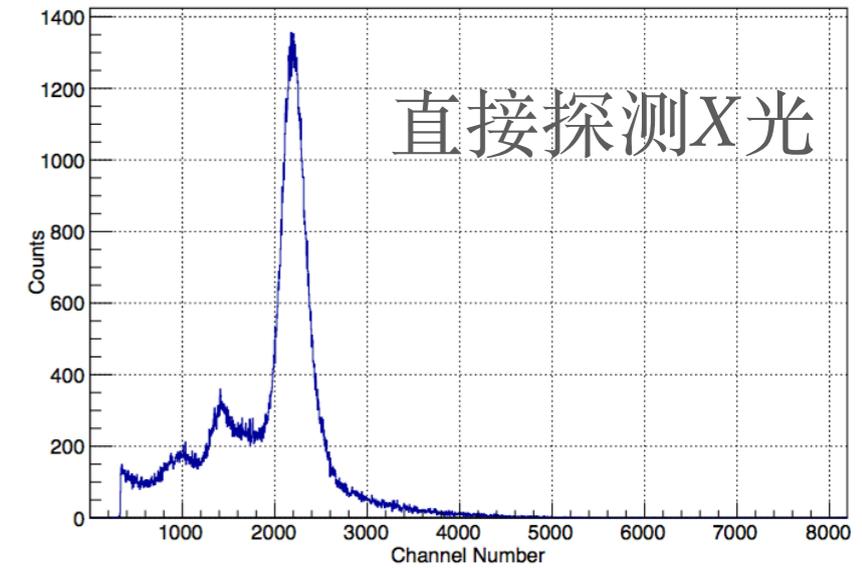
X光响应



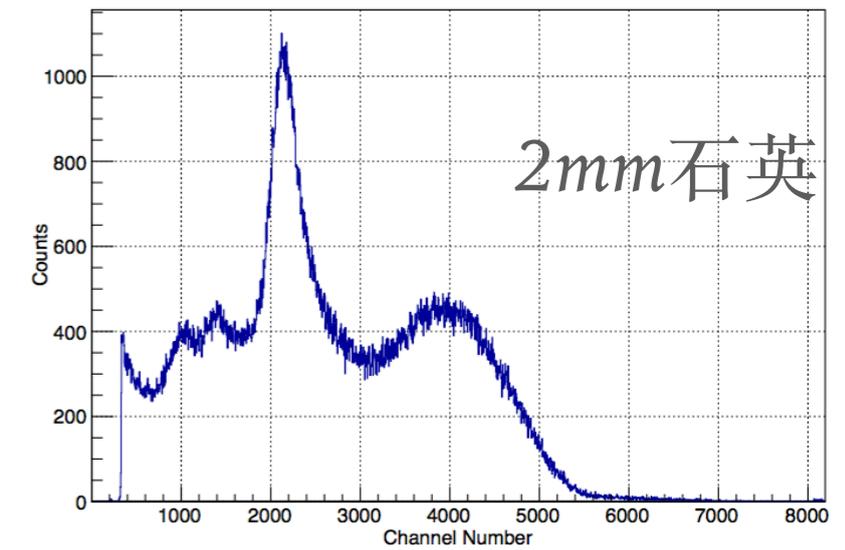
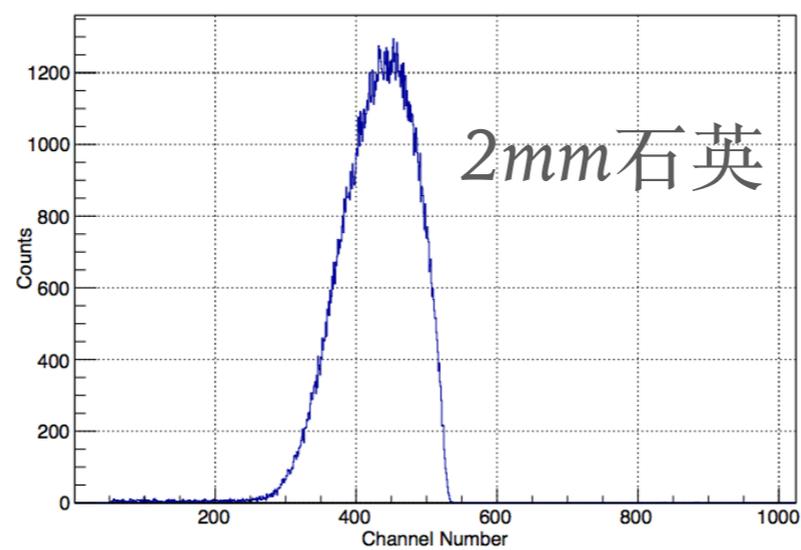
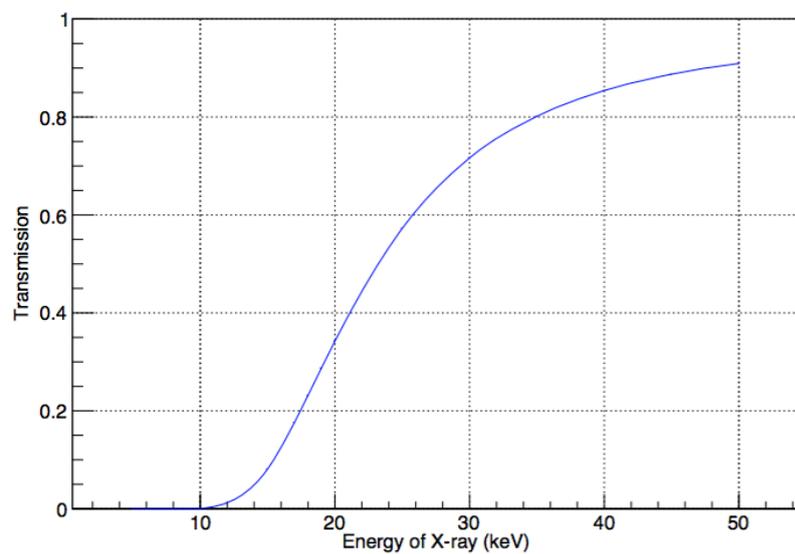
CdTe



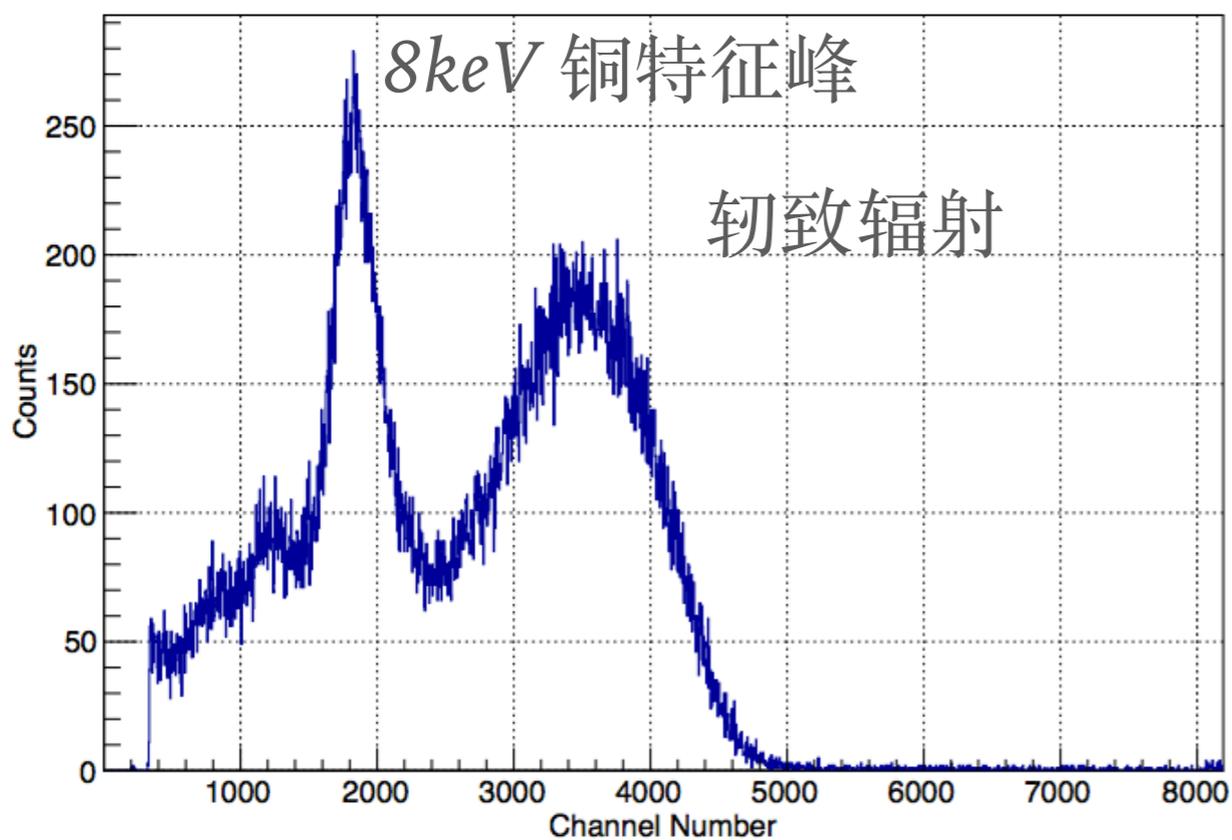
THGEM



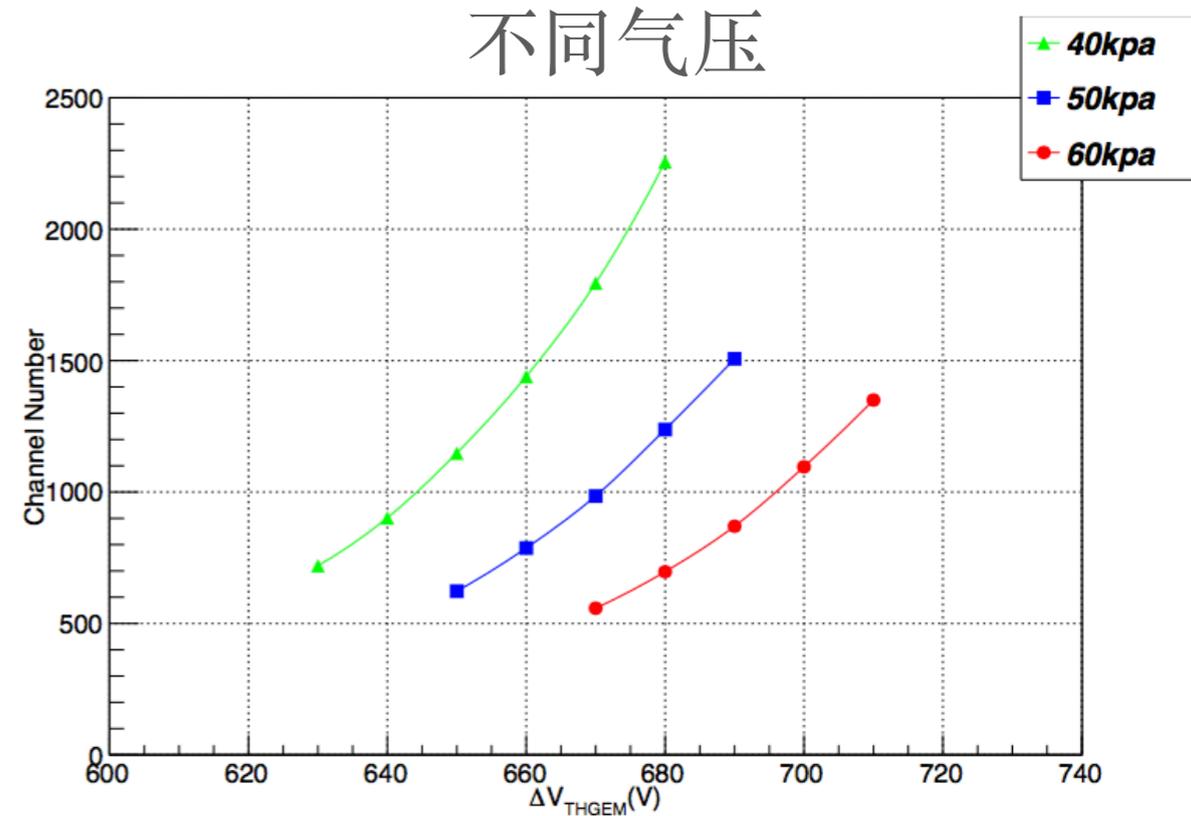
模拟X光透过效率



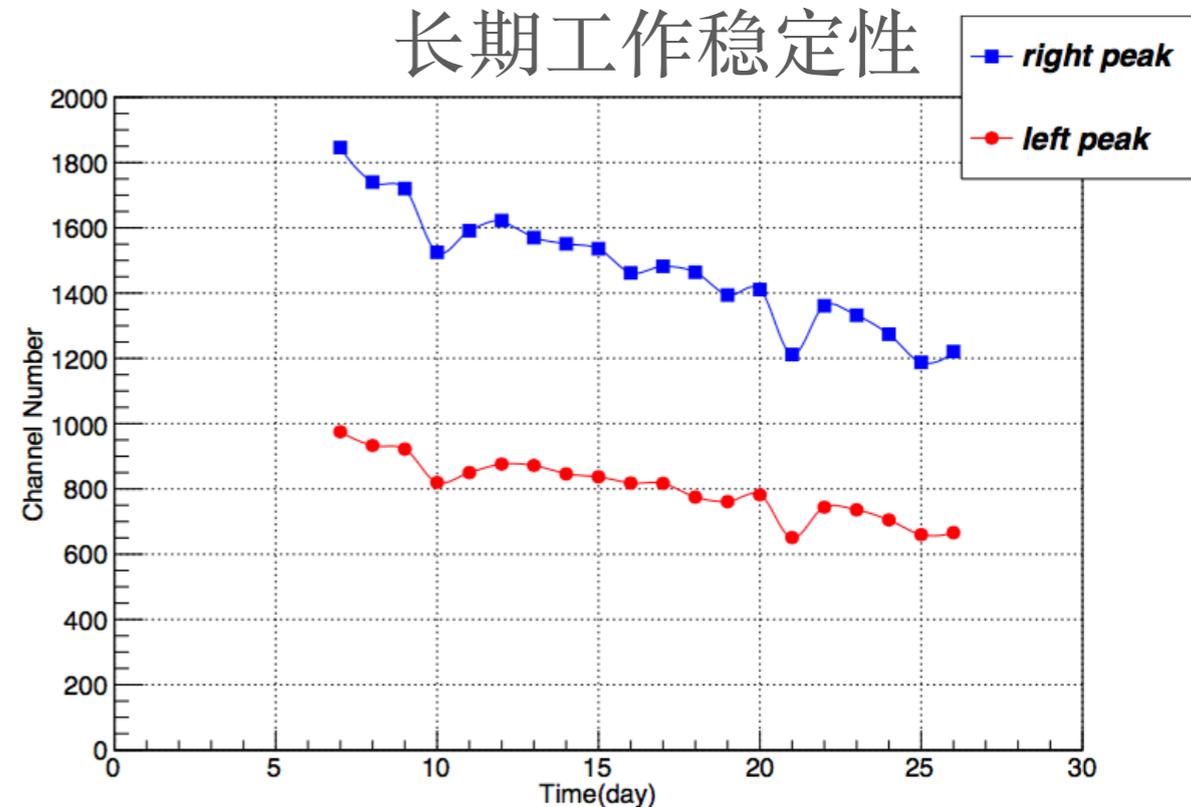
密闭THGEM (2mm石英窗)



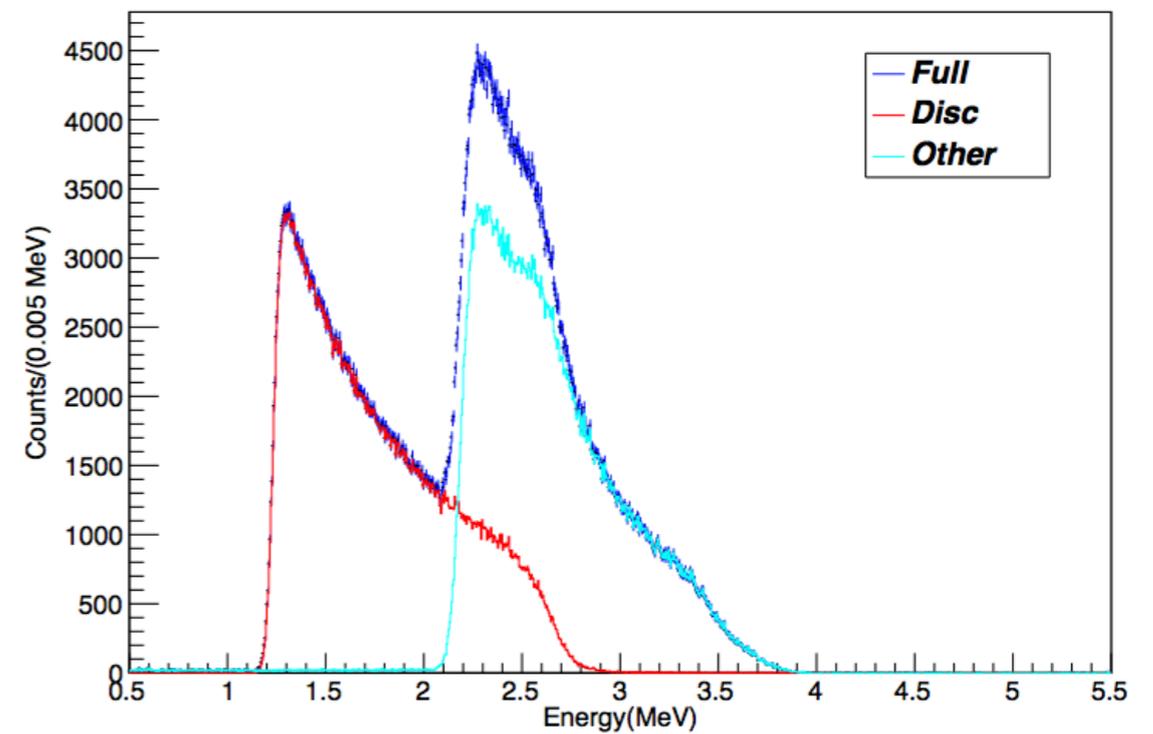
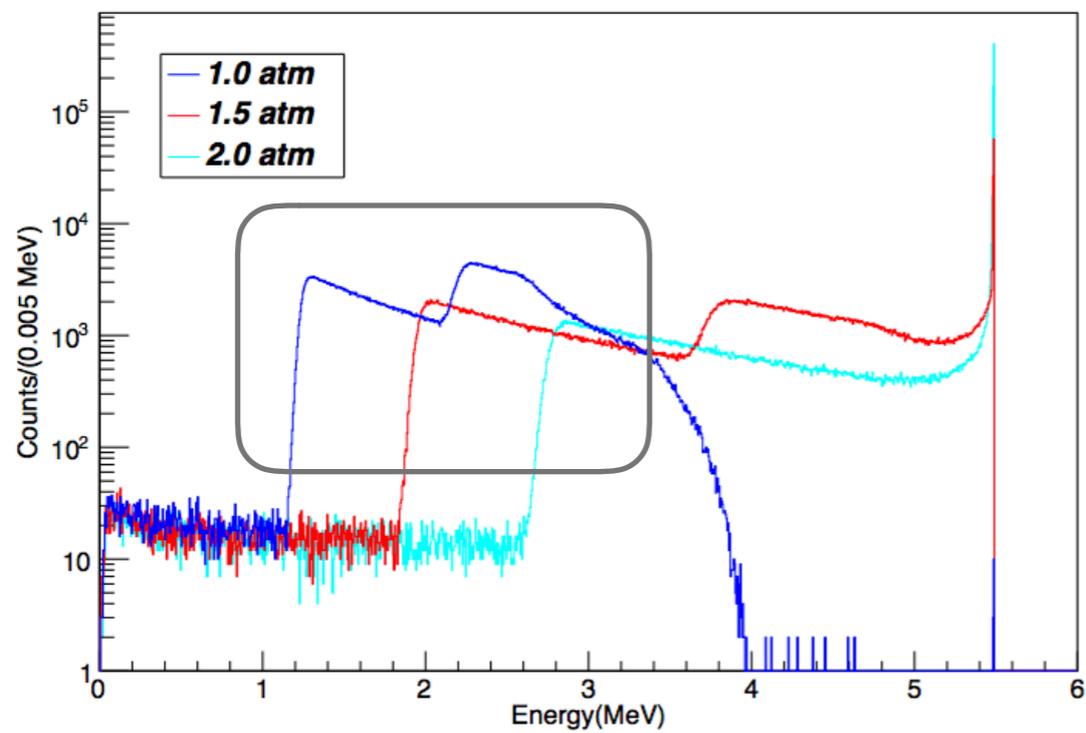
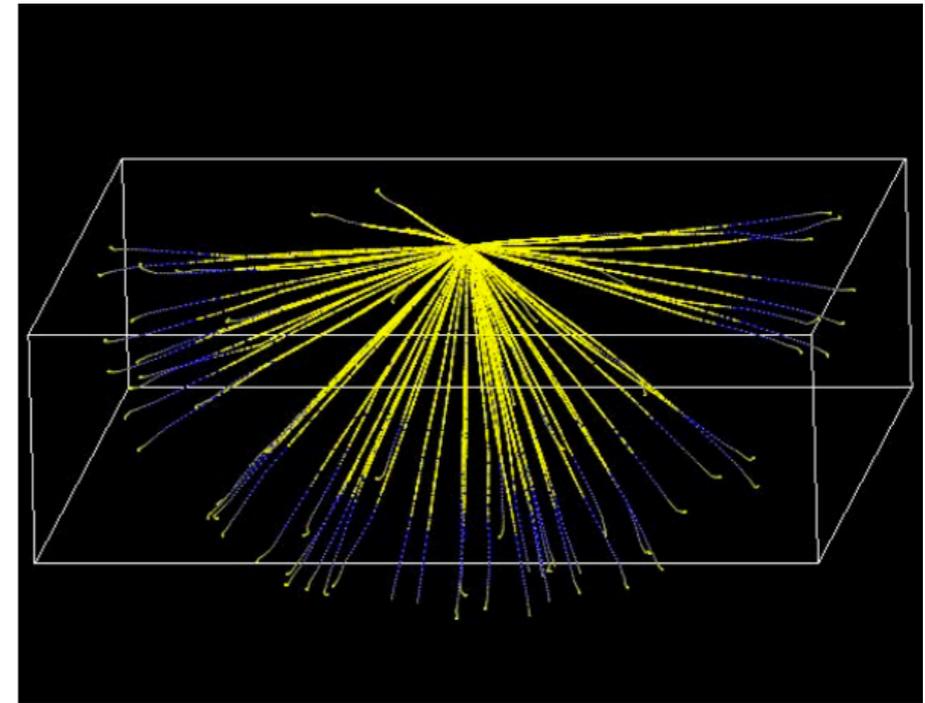
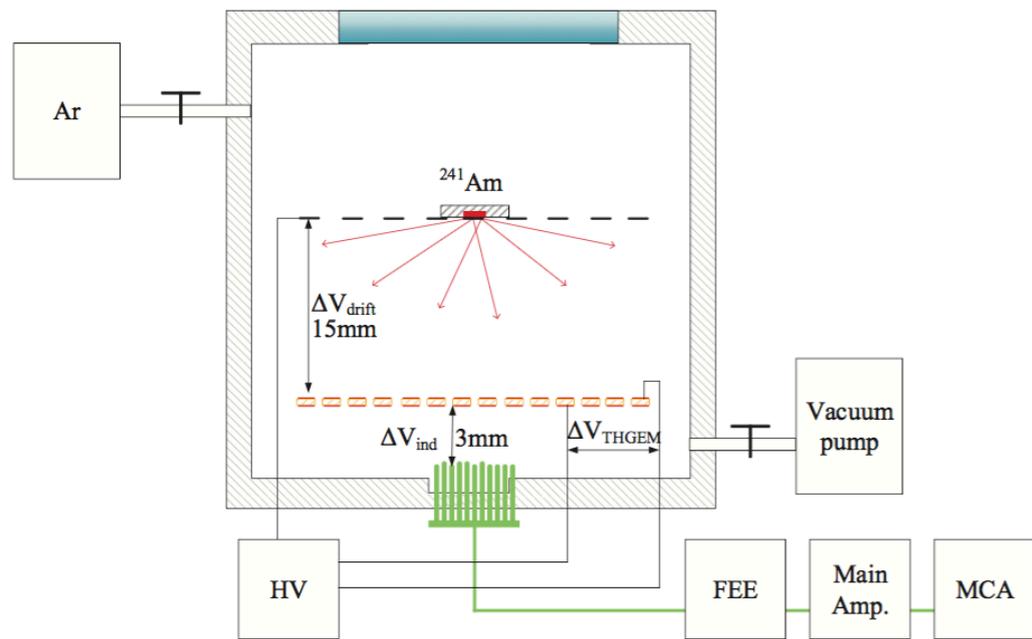
不同气压



长期工作稳定性



性能研究



总结

- ▶ 开展了THGEM不同生产工艺的研究，并开展了一系列的性能研究，得到了一套成品率高，增益达 $1E4$ 的不同尺寸THGEM的生产工艺。
- ▶ 在重点实验室的经费支持下，我们开展了井型THGEM相关研究，进行了性能测试并进行了束流测试，测定了其对强子的探测效率。
- ▶ 在取得的工作基础上开展了密闭THGEM探测器的研究，并进行了X光和alpha粒子的测试。

感谢核探测与核电子学重点实验室的支持

谢谢大家！