

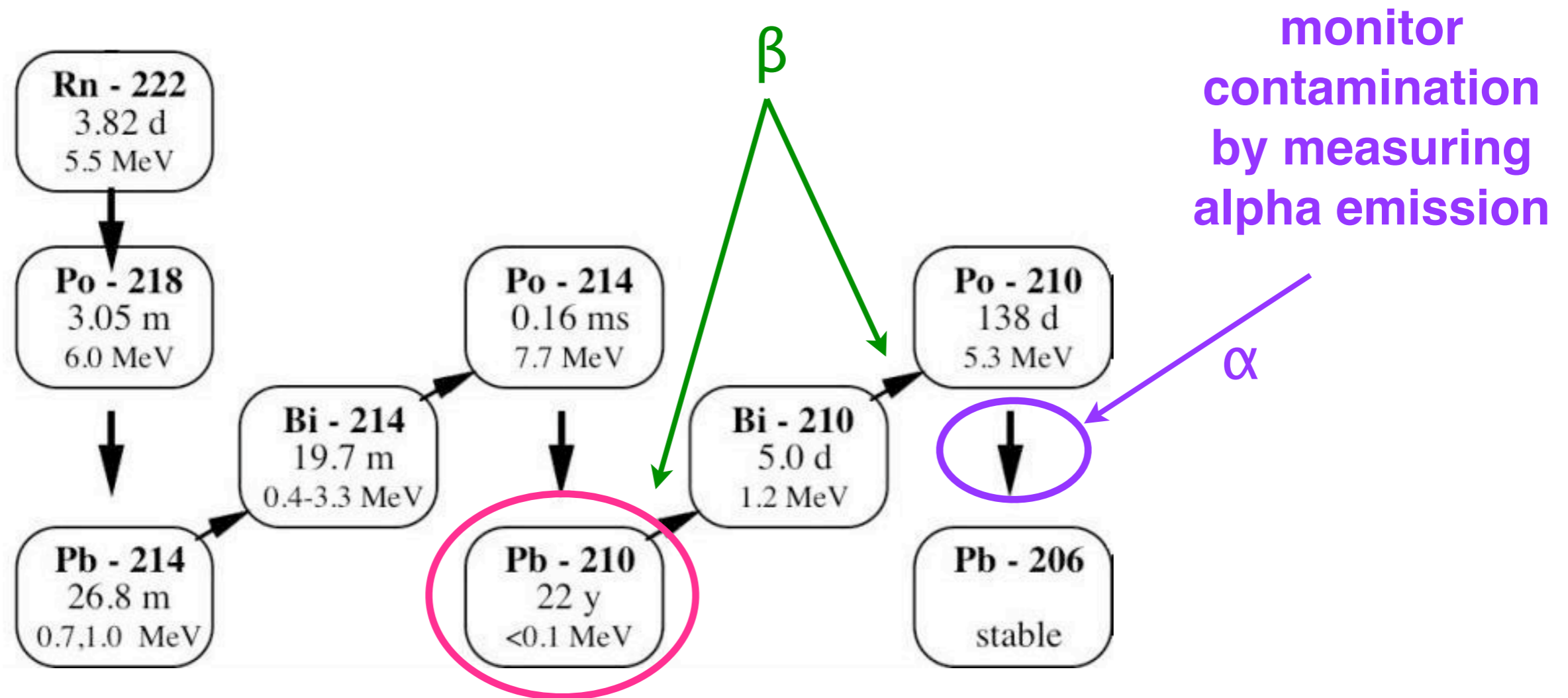
XIA ALPHA COUNTER

JODI COOLEY
SOUTHERN METHODIST UNIVERSITY

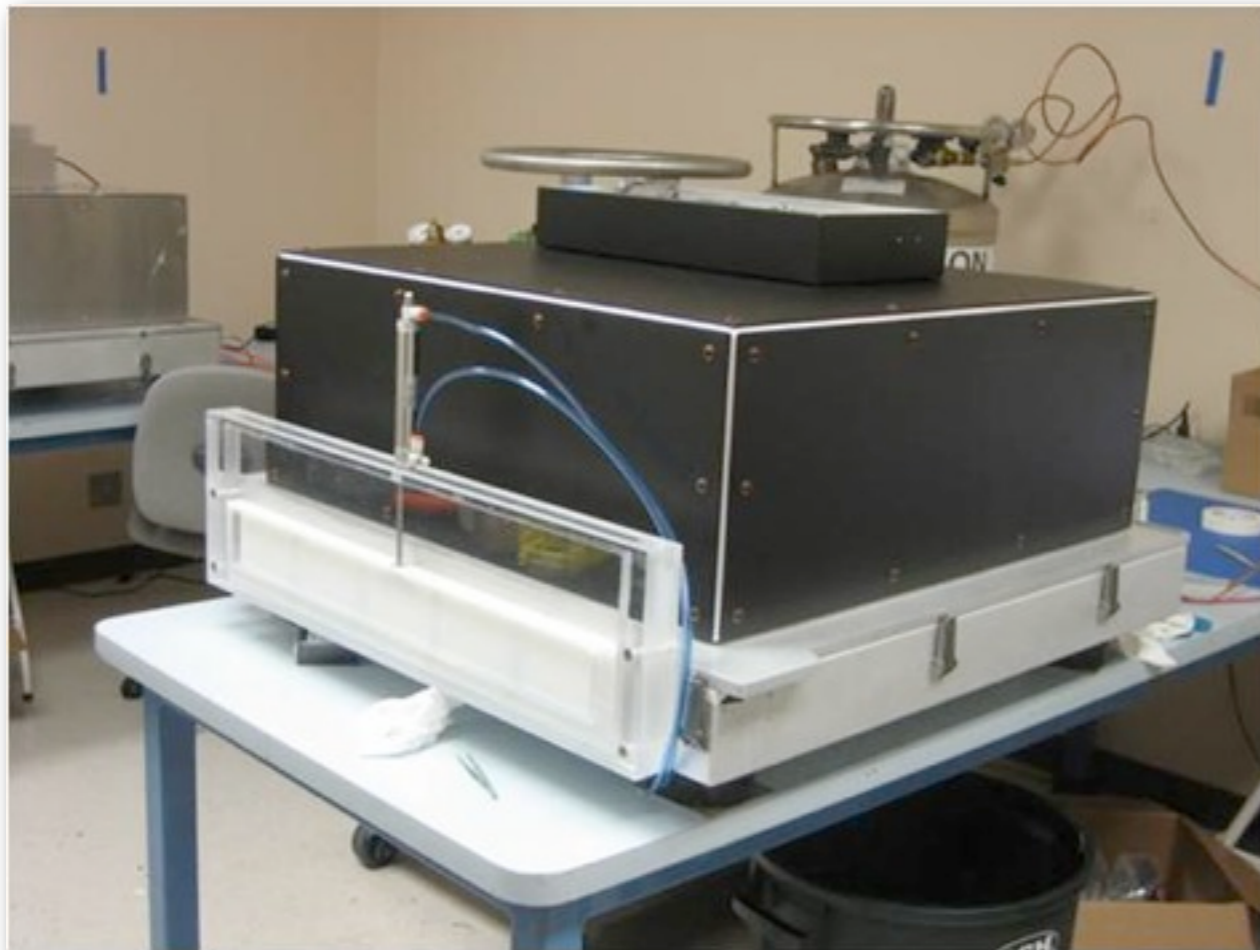
MORE DETAILS - L. HSIU POSTER



SURFACE CONTAMINATION: RADON



XIA ALPHA COUNTER

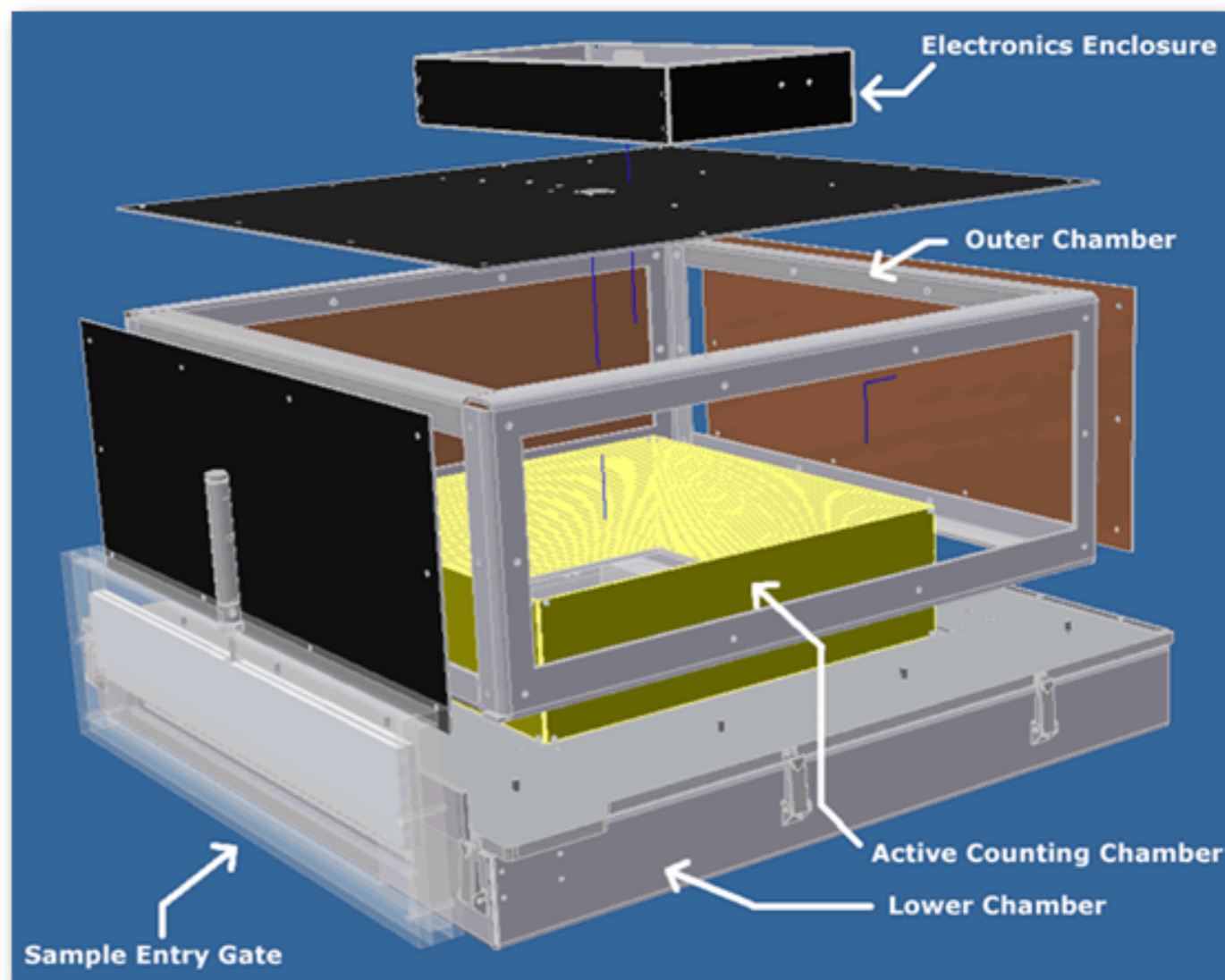


- **Easiest way to monitor ^{210}Pb contamination is to measure alpha-particle emission.**
- **XIA UltraLo 1800 prototype evaluation and testing was done at Stanford**
- **Spring 2010 moved to Fermilab to screen materials for SuperCDMS SNOLAB**

**see L. Hsu
poster for details**

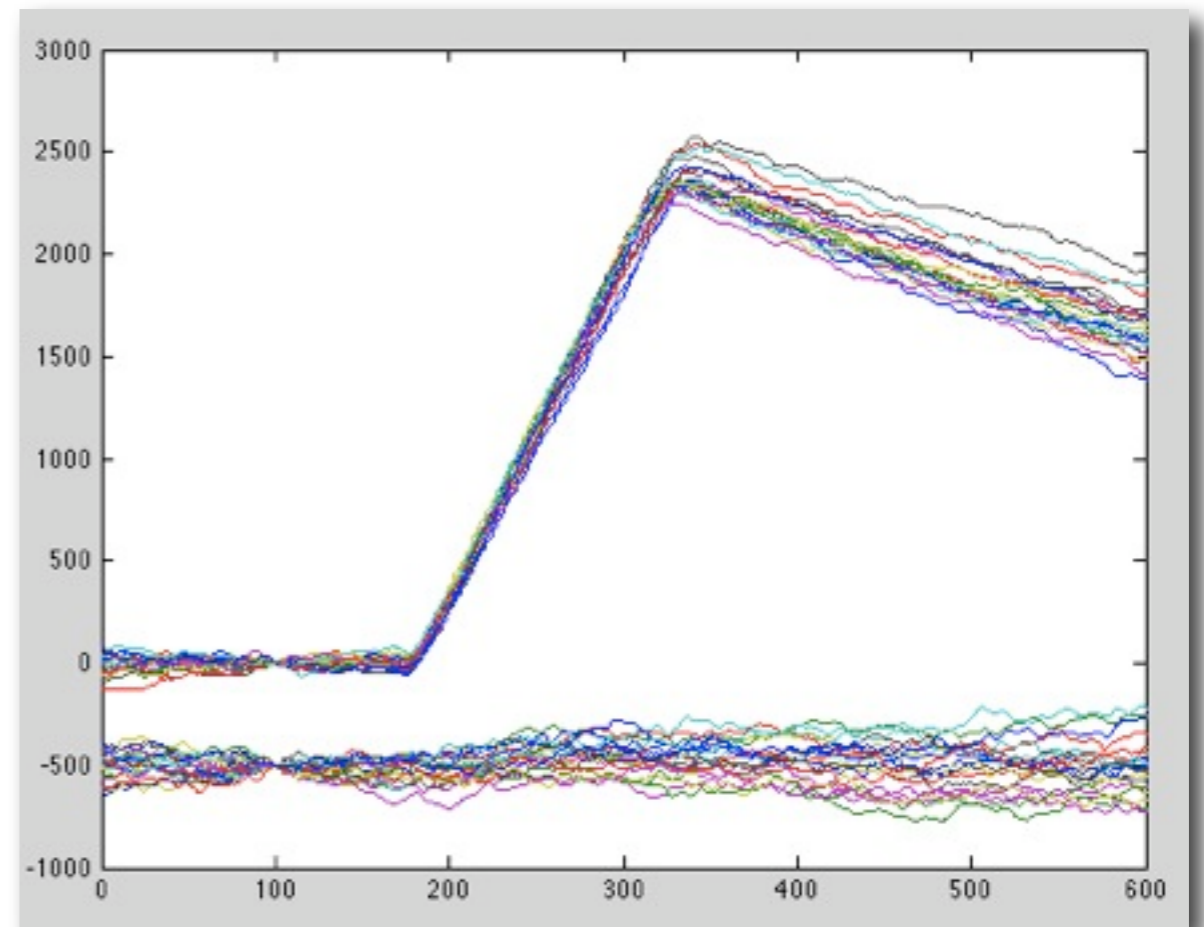
DETECTOR DETAILS

- **Drift chamber:**
 - **21 x 21 inches**
 - **15 in tall**
- **Counting area:**
 - **19 x19 inches**
(inner electrode);
 - **1 inch outer guard**
- **Argon gas purge**
 - **20 L/m prior to data taking**
 - **4 L/m during normal operation**



PARTICLE IDENTIFICATION

- **Alphas:** energy > 2 MeV, little guard ring activity, risetime between 60-80 μ s
- **Ceiling:** low energy, low risetime
- **Sidewall:** significant guard ring activity
- **Noise:** events not fitting into other classifications



Pulses from ^{230}Th Source

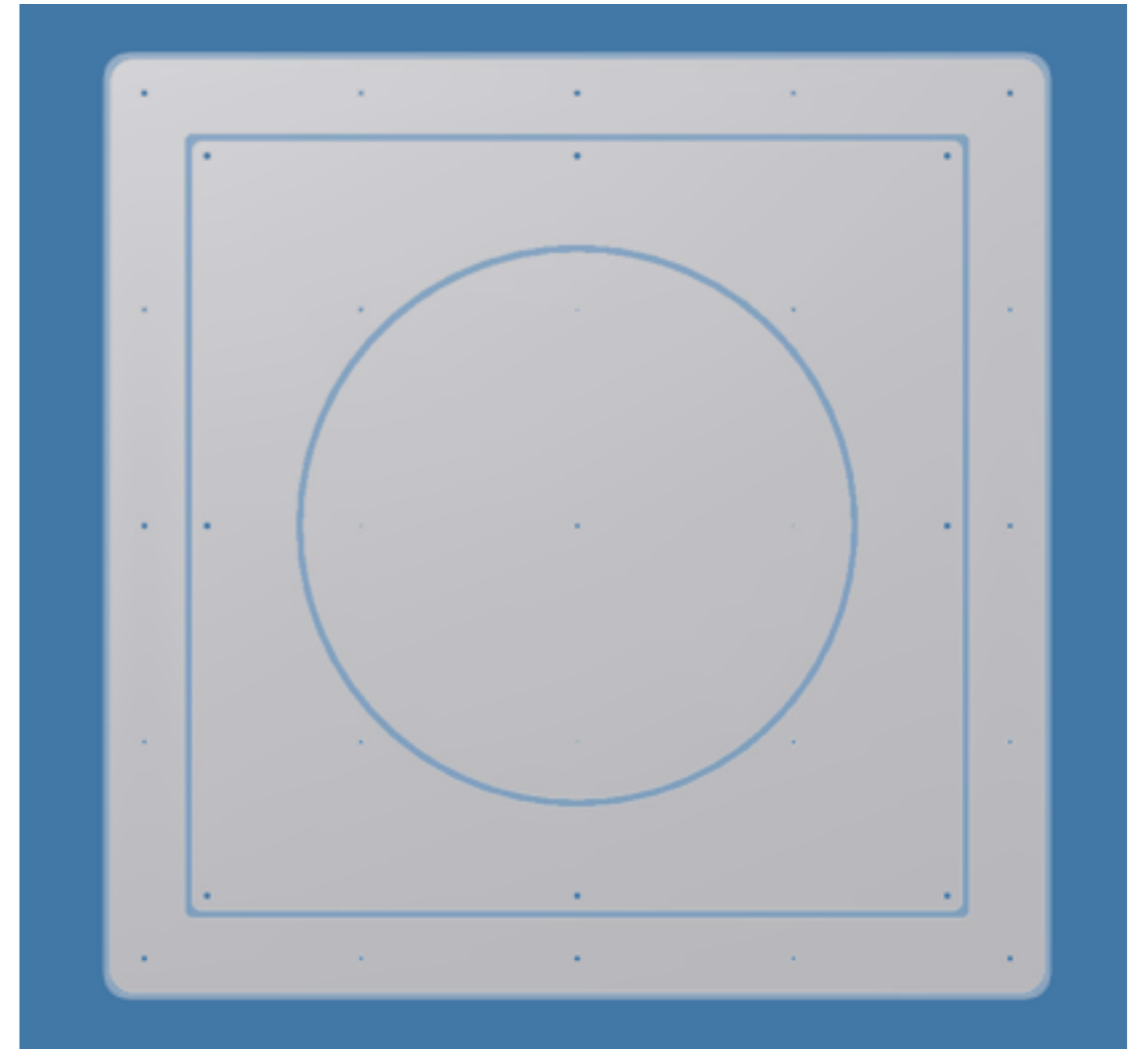
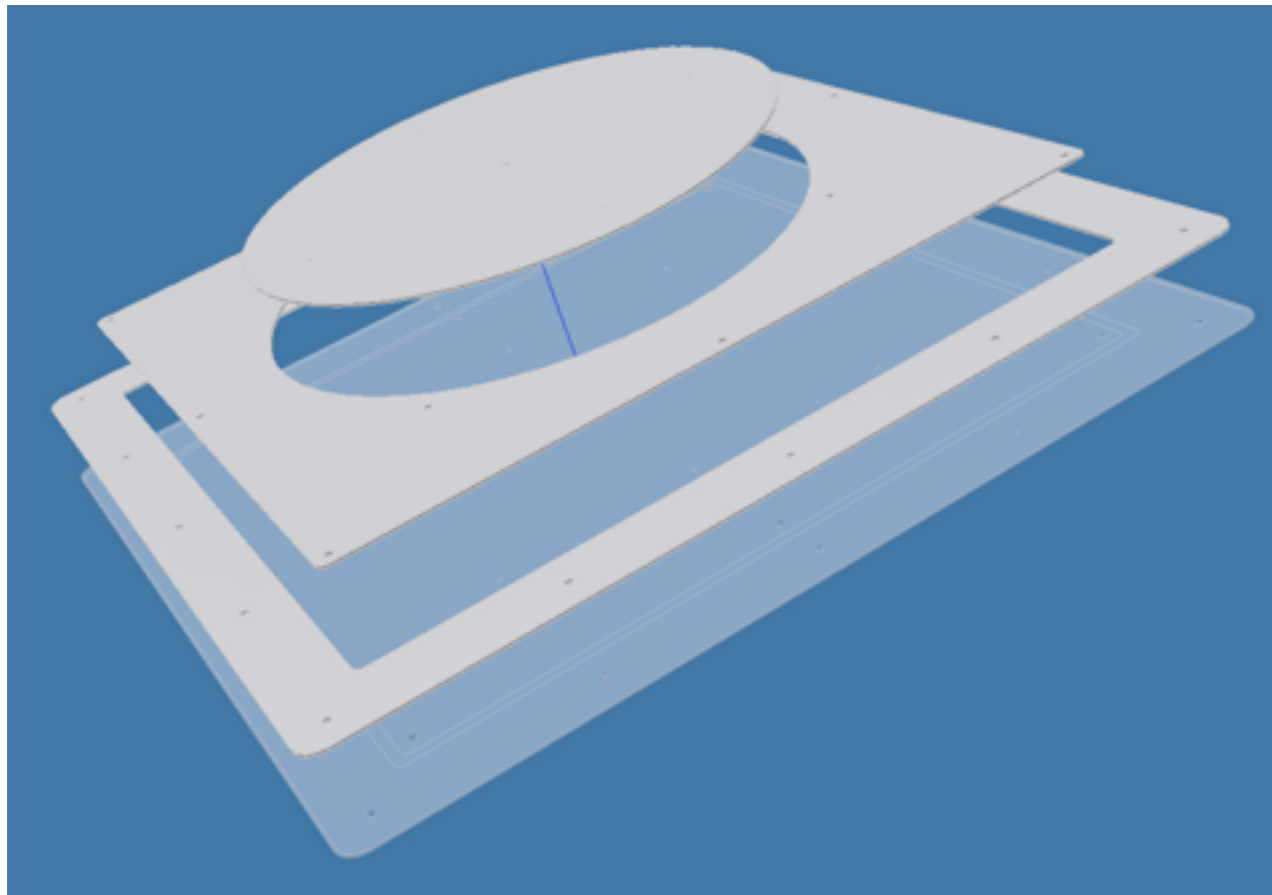
SENSITIVITY OF PROTOTYPE

- **Stanford prototype**
 - **0.0003 $\alpha/\text{hr}\text{-CM}^2$ (paper in progress).**
- **IBM prototype**
 - **0.0006 $\alpha/\text{hr}\text{-cm}^2$ (published in NSREC proceedings 2009).**
- **Sensitivity is limited by mid-air events which can not be subtracted off.**
- **XIA is studying the effects of comogenics by running the counter in various locations**
 - **SUF - 10 mwe (under analysis)**
 - **Soudan - 2040 mwe (currently operating)**
 - **ASTEP - France Alps, elev. 2552 meters (moving soon)**
- **Approximately x10 more sensitive than other commercial proportional counters.**

PRODUCTION MODEL

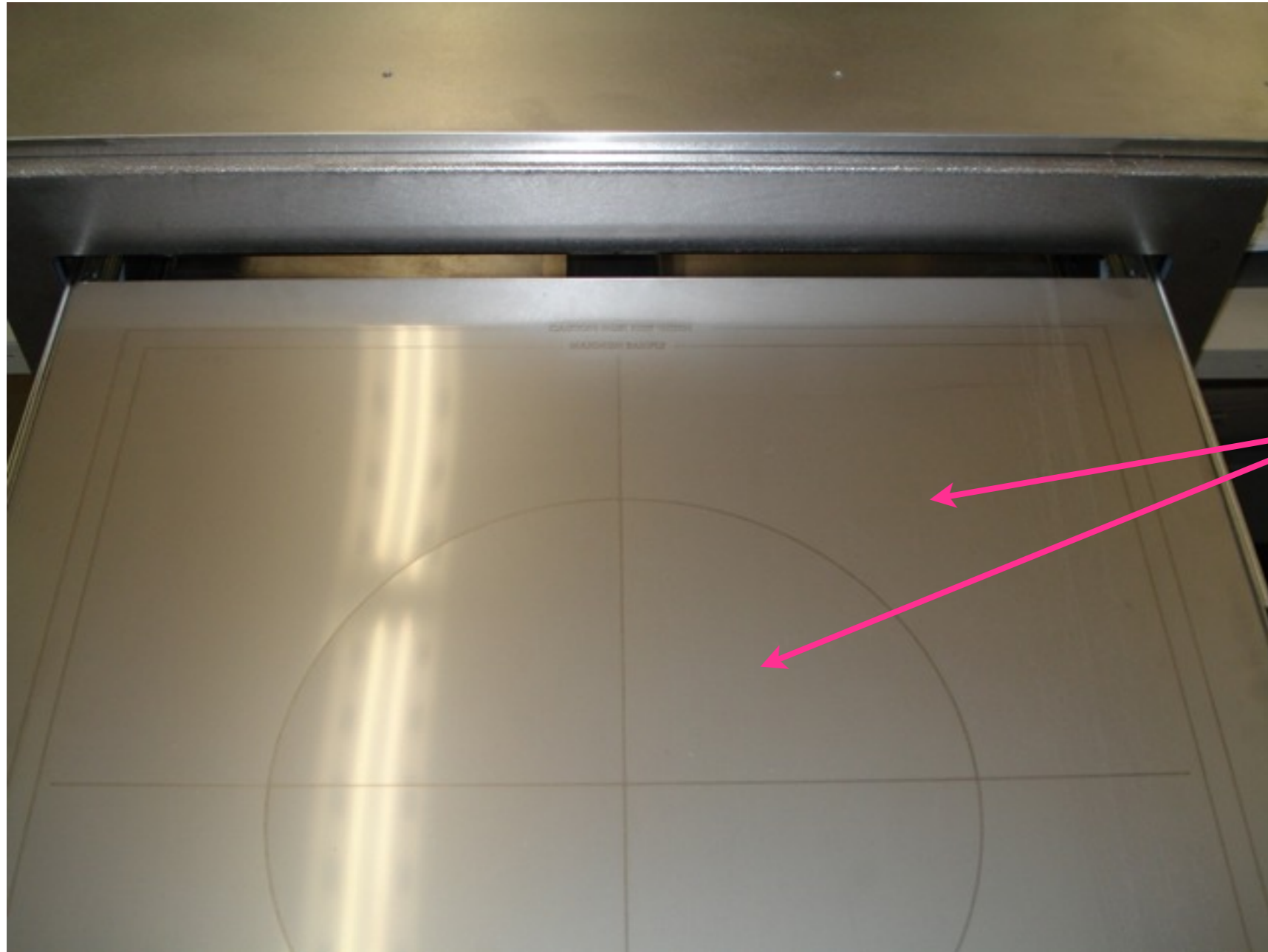


ELECTRODE DESIGN CHANGES



**Adjustable inner electrode size:
1800 cm² or 707 cm²**

ELECTRODE DESIGN CHANGES



**Adjustable inner
electrode:
1800 cm² or 707 cm²**

NEW SAMPLE HANDLING SYSTEM



LOWER HALF ASSEMBLY



SOFTWARE IMPROVEMENTS

- **communication scheme**
 - **changed to USB, more robust and faster.**
- **new analysis:**
 - **more plots and displays**
- **safety:**
 - **tilt sensors shut off HV when machine is bumped**
- **moisture sensors:**
 - **added for monitoring purposes.**

TIMELINE

- **Assembly of first production unit is near completion. Expected delivery to XIA LLC Friday, August 27.**
- **Qualification and testing at XIA LLC.**
- **If it passes, expect to start initial production of a small number of units**