XIA ALPHA COUNTER PROGRESS REPORT

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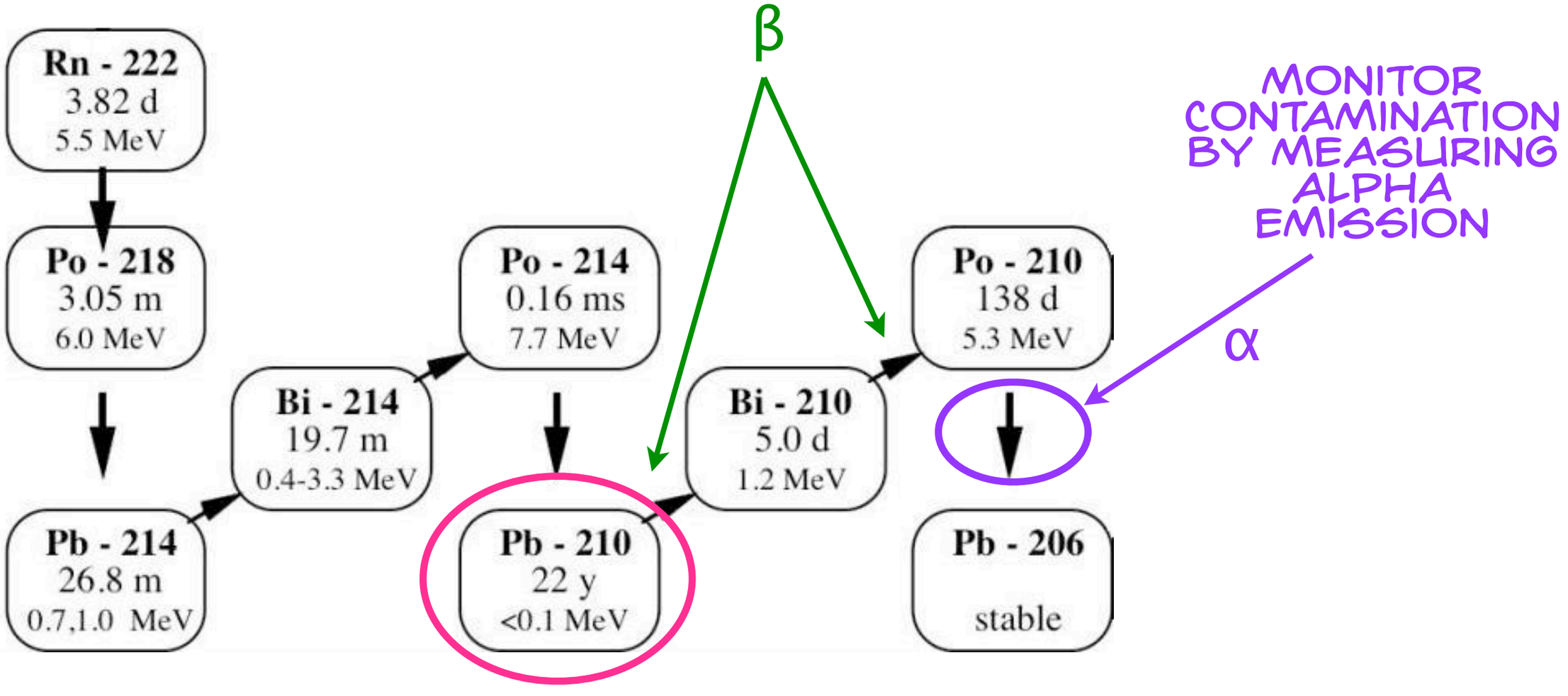
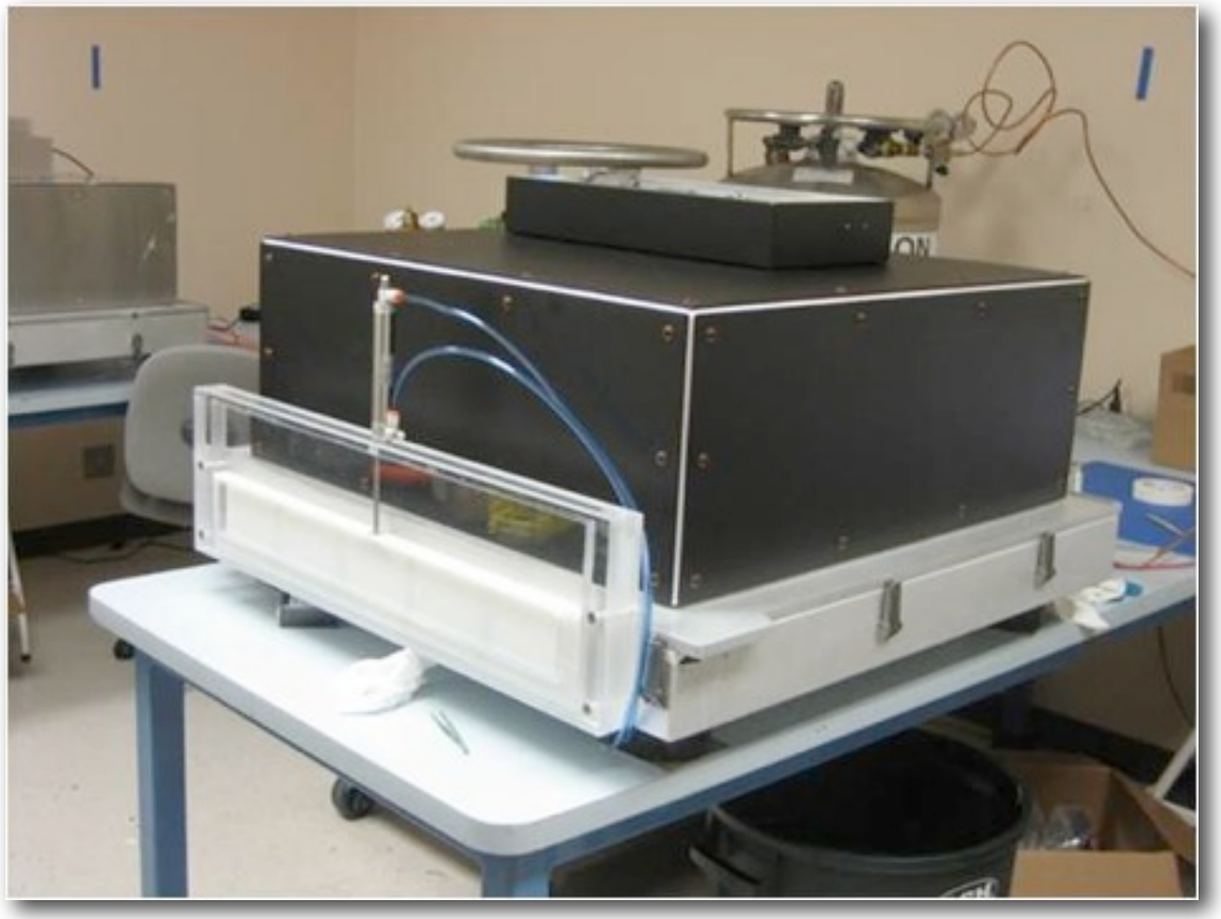
SURFACE CONTAMINATION: RADON



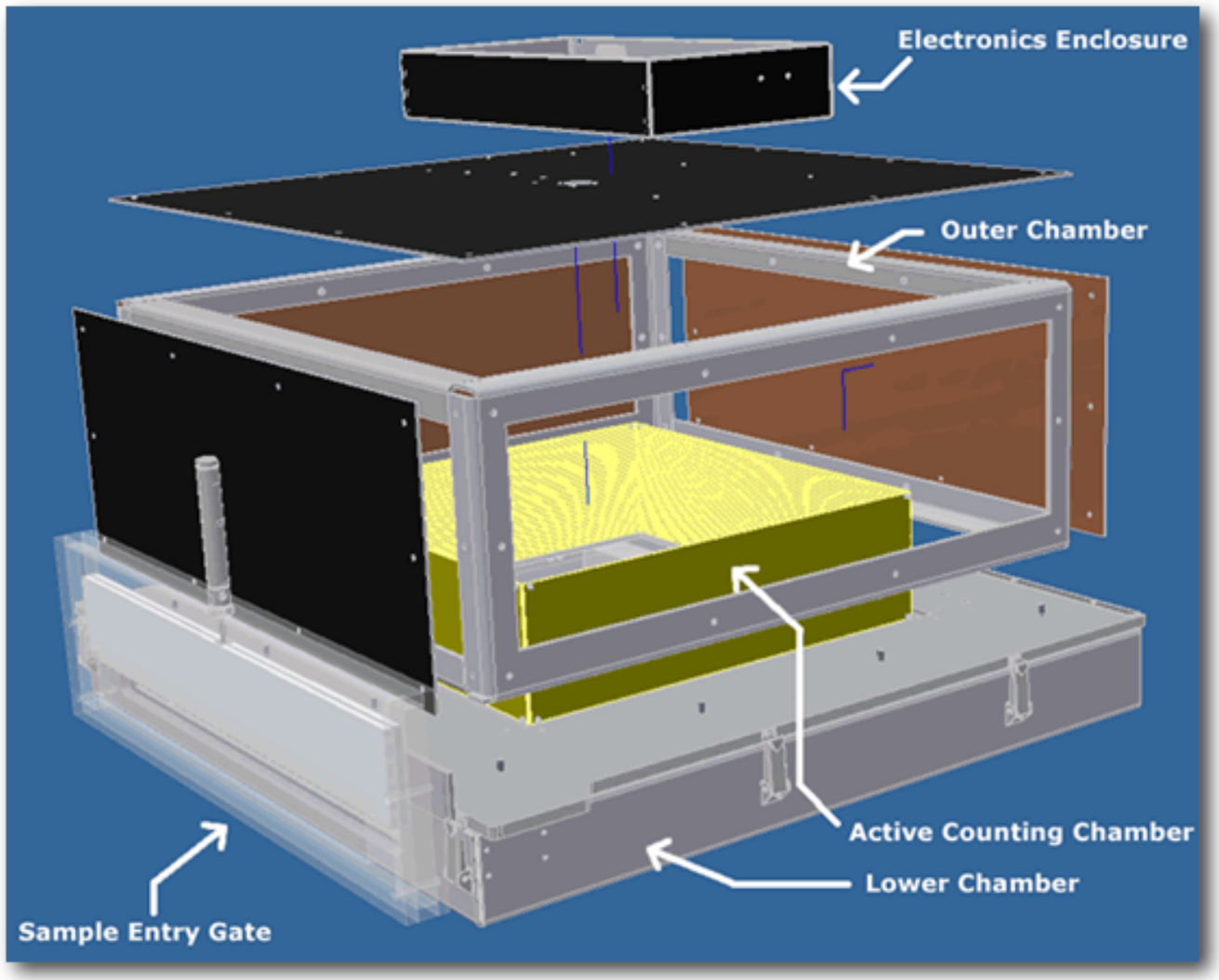
XIA ALPHA COUNTER



- EASIEST WAY TO MONITOR ^{210}PB CONTAMINATION IS TO MEASURE ALPHA-PARTICLE EMISSION.
- XIA ULTRALO 1800 PROTOTYPE EVALUATION AND TESTING AT STANFORD
- COUNTING AREA: 1800 CM^2

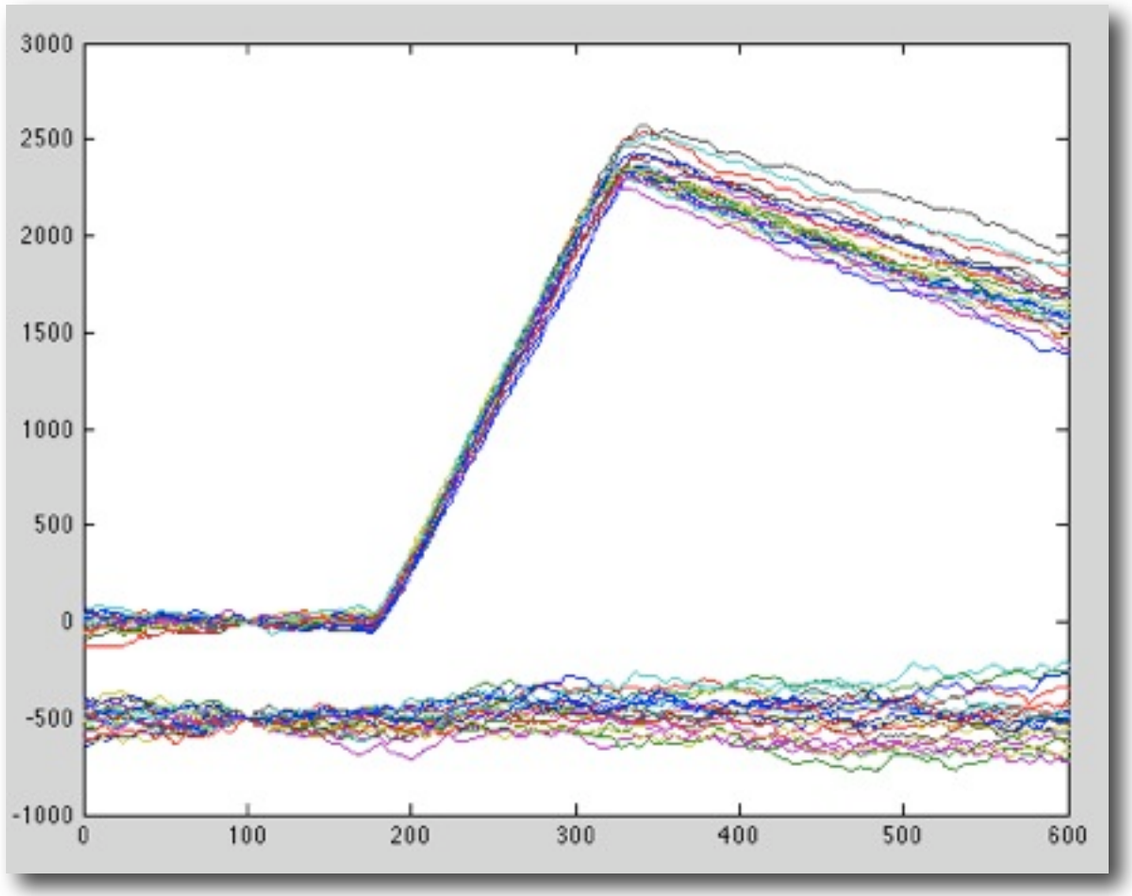
DETECTOR DETAILS

- DRIFT CHAMBER: 21 INCHES SQUARE, 15 IN TALL.
- COUNTING AREA: 19 INCHES SQUARE (INNER ELECTRODE); 1 INCH OUTER GUARD
- ARGON GAS PURGED AT 20 LITERS PER MIN PRIOR TO DATA TAKING; FLOW RATE OF 4 LITERS PER MIN DURING NORMAL OPERATION



PARTICLE IDENTIFICATION

- ALPHAS: ENERGY > 2 MEV, LITTLE GUARD RING ACTIVITY, RISETIME BETWEEN 60-80 HS
- CEILING: LOW ENERGY, LOW RISETIME
- SIDEWALL: SIGNIFICANT GUARD RING ACTIVITY
- NOISE: EVENTS NOT FITTING INTO OTHER CLASSIFICATIONS

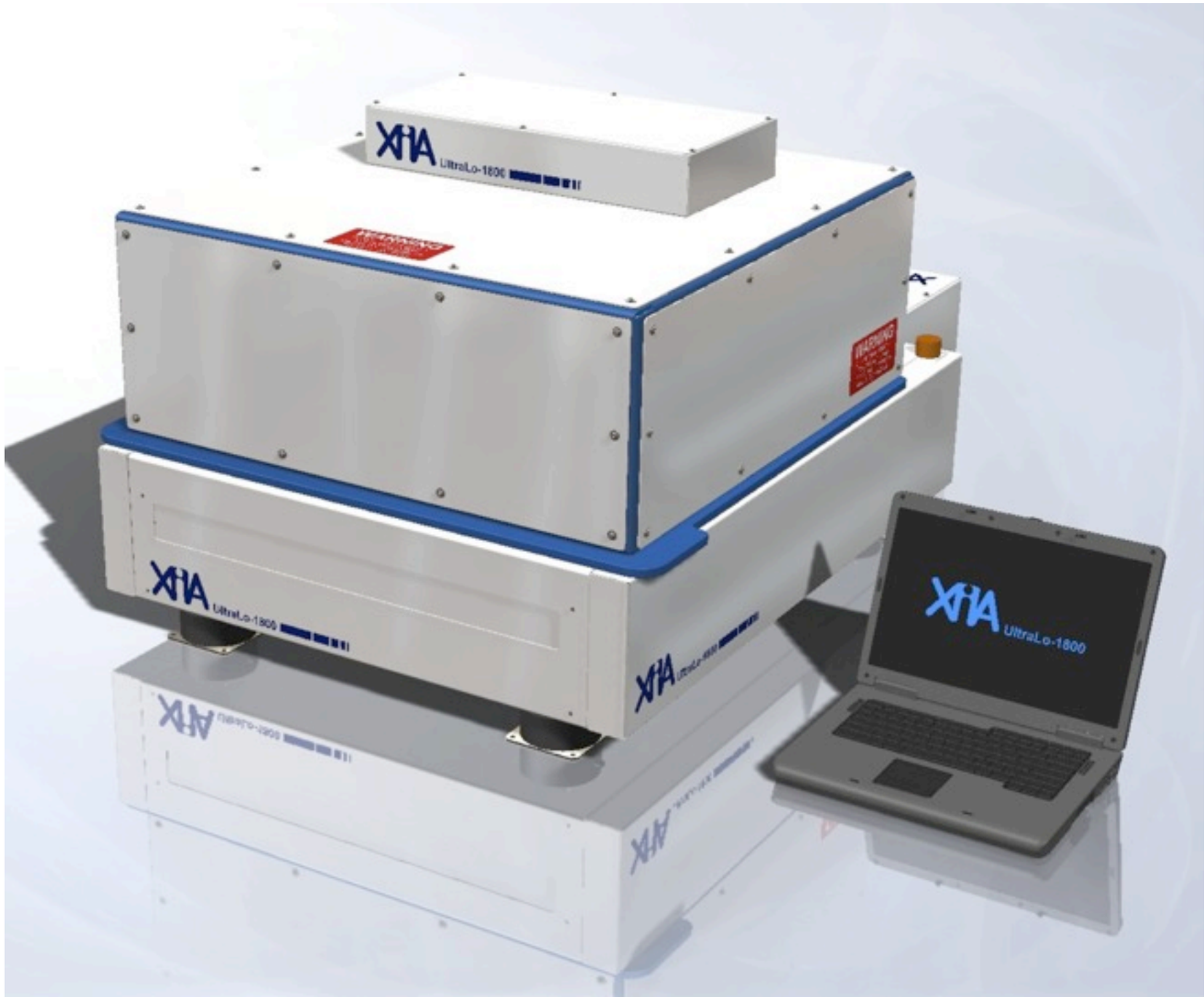


PULSES FROM A ^{230}TH SOURCE

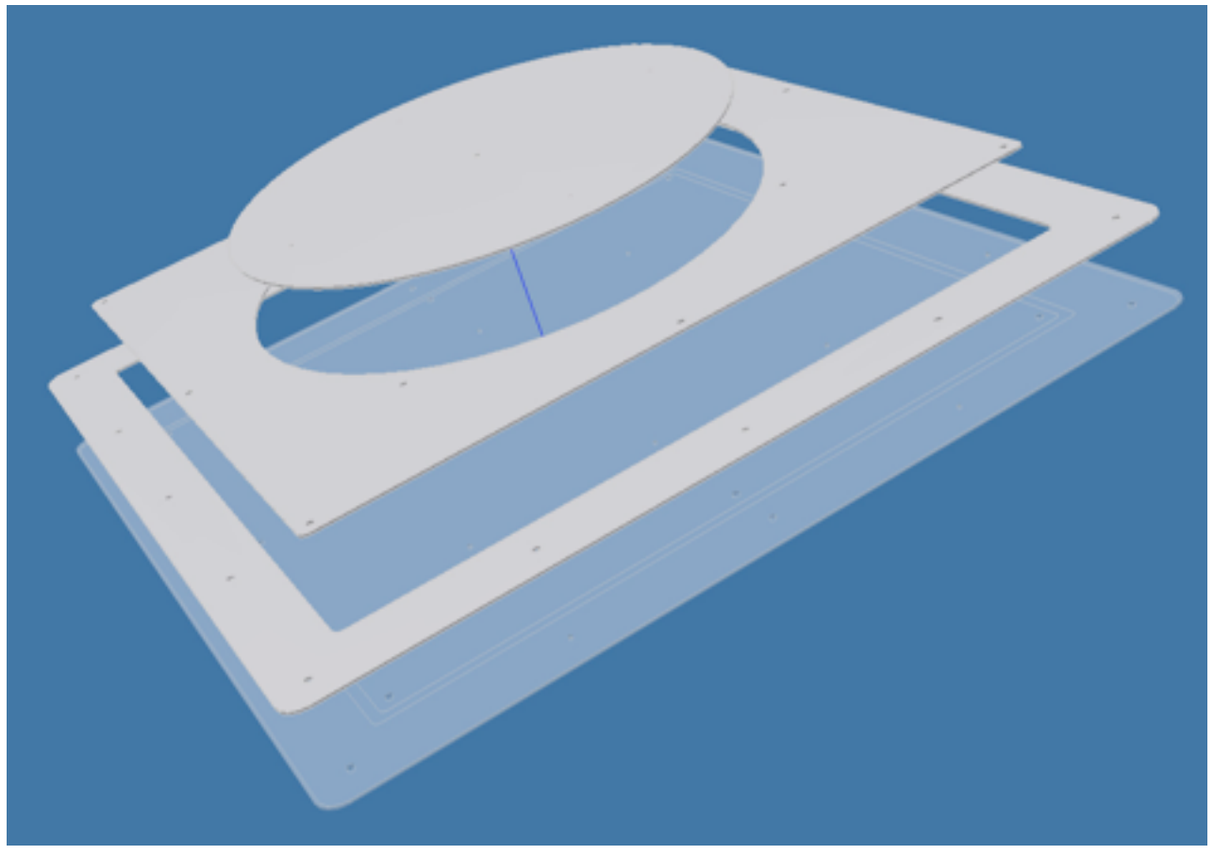
SENSITIVITY OF PROTOTYPE

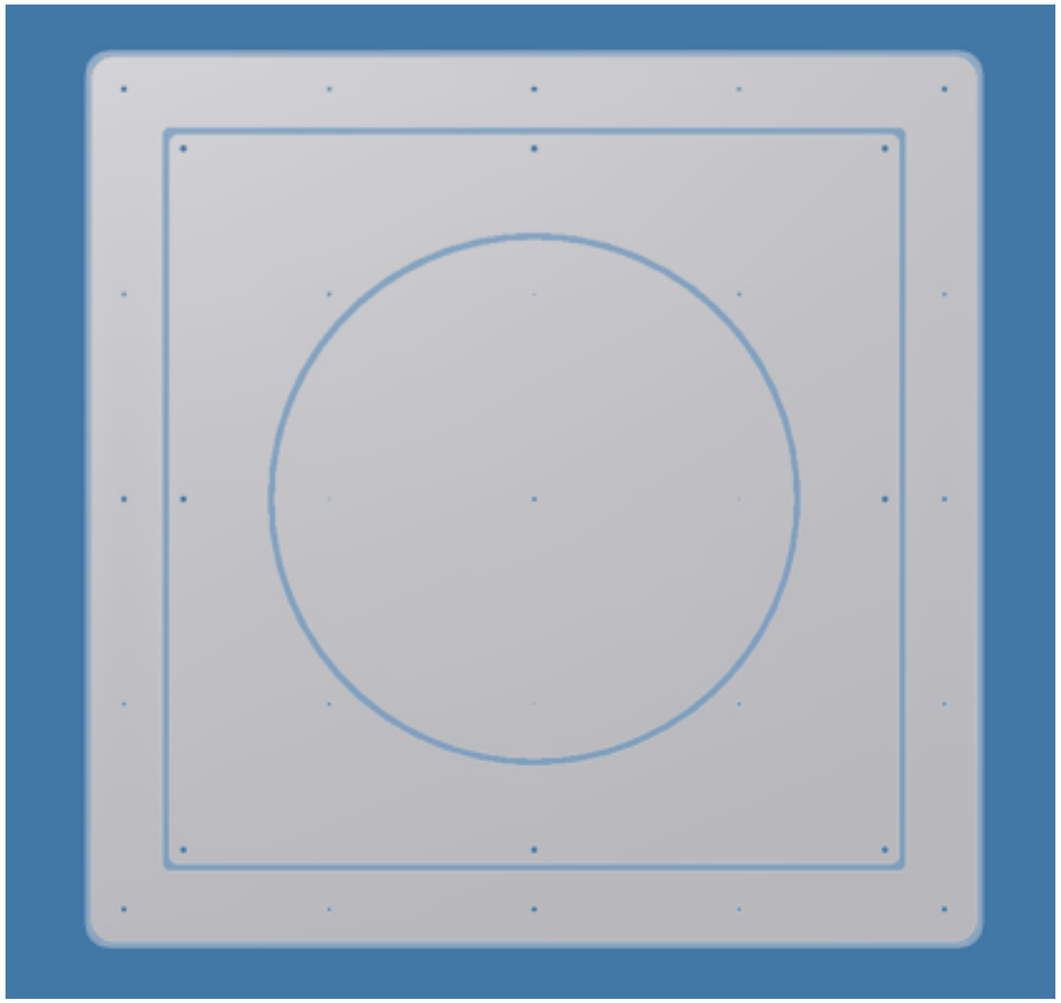
- IBM DEMONSTRATED SENSITIVITY OF 0.0006 α/HR-CM² (PUBLISHED IN NSREC PROCEEDINGS 2009).
- STANFORD PROTOTYPE ACHIEVED BACKGROUNDS OF 0.0003 α/HR-CM² (PAPER IN PROGRESS).
- SENSITIVITY IS LIMITED BY MID-AIR EVENTS WHICH CAN NOT BE SUBTRACTED OFF. ORIGIN OF EVENTS UNDER INVESTIGATION.
- APPROXIMATELY X10 MORE SENSITIVE THAN OTHER COMMERCIAL PROPORTIONAL COUNTERS.

PRODUCTION MODEL



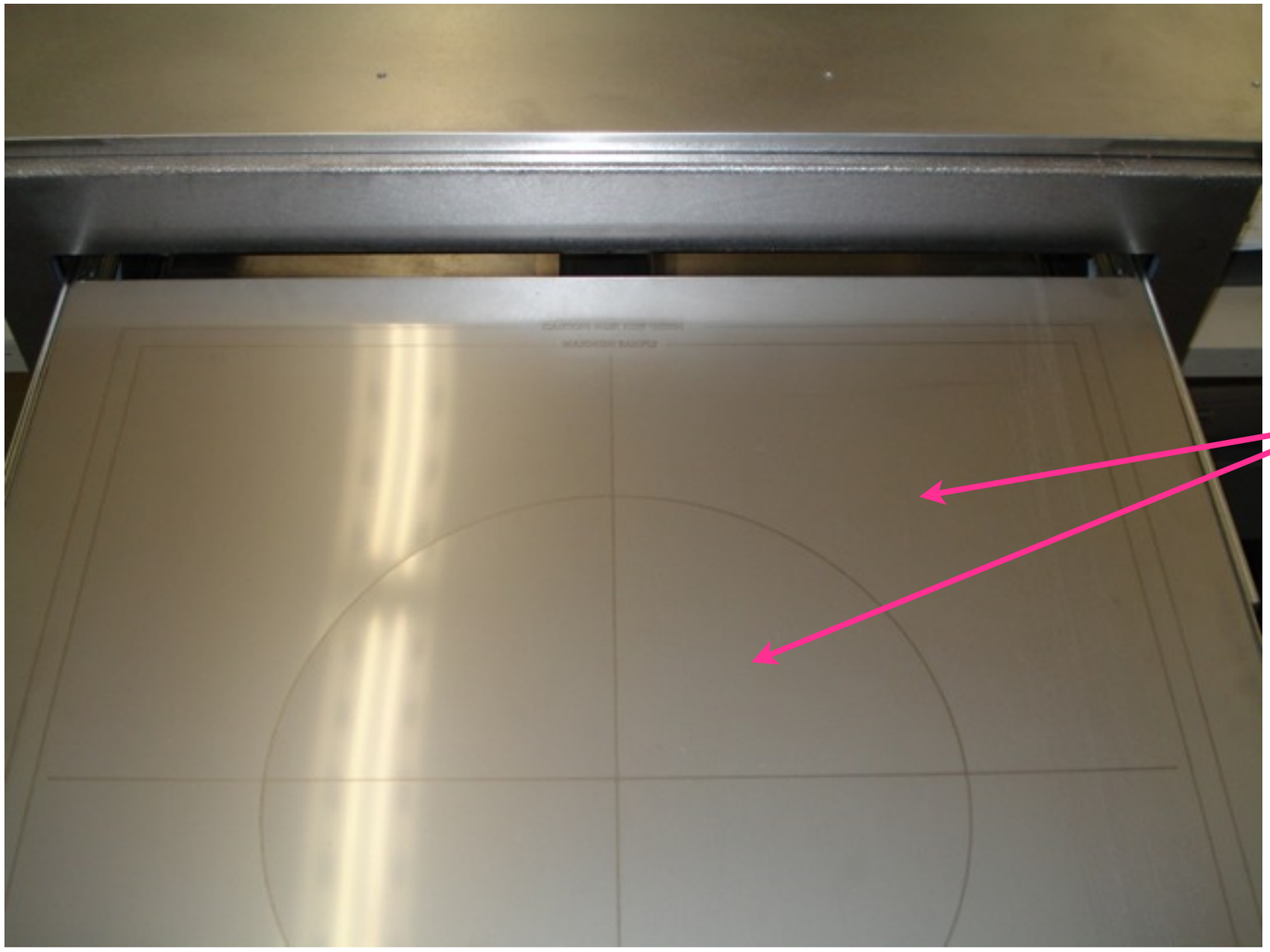
ELECTRODE DESIGN CHANGES





ADJUSTABLE INNER ELECTRODE SIZE:
1800 CM^2 OR 707 CM^2

ELECTRODE DESIGN CHANGE



ADJUSTABLE INNER ELECTRODE SIZE: 1800 CM^2 OR 707 CM^2

NEW SAMPLE HANDING 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 OF HV WHEN MACHINE IS BUMPED
- MOISTURE SENSORS ADDED FOR MONITORING PURPOSES.

TIMELINE

- CURRENTLY BUILDING LOWER HALF. UPPER HALF TO FOLLOW.
- SUMMER 2010 - UNIT SHOULD BE READY FOR QUALIFICATION AND TESTING AT XIA LLC. (1 MONTH)
- IF IT PASSES, EXPECT TO START INITIAL PRODUCTION OF A SMALL NUMBER OF UNITS

COST ESTIMATES

- CURRENTLY 3 DETECTORS PLANNED TO BE LOCATED UNDERGROUND
- $55K + 20% CONTINGENCY PER DETECTOR
- AR GAS ~ $10K PER YEAR PER DETECTOR (OPERATION COST BASED ON STANFORD)
- OLD AIR (OPERATION COST, POSSIBLY NEEDED)