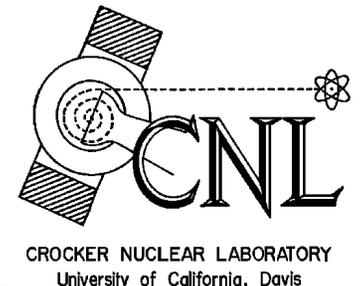
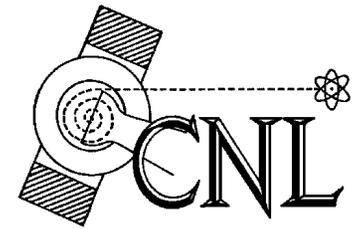


Laboratory Improvements at UC Davis

Chuck McDade & Nicole Hyslop
Crocker Nuclear Laboratory
University of California, Davis
Stevenson, Washington
October 2010



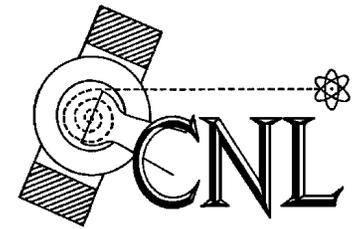


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X-RAY FLUORESCENCE



PANalytical Epsilon 5 XRF

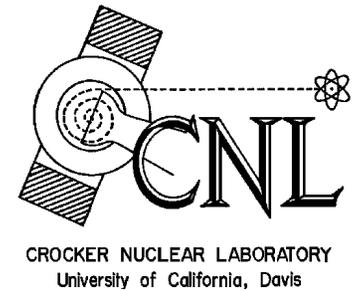


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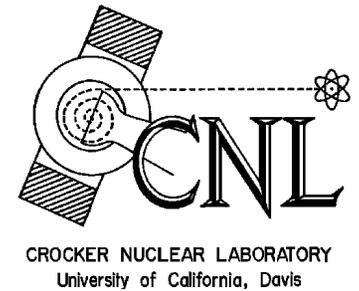
Why Change?



- Existing XRF system has failing components, plus outdated electronics & computers
- Expertise to overhaul & redesign has retired
- Cost to overhaul & redesign could approach that of new instruments
- Excellent commercial systems are available; UCD's system no longer offers a unique capability
- Commercial systems require less labor, thus long-term savings



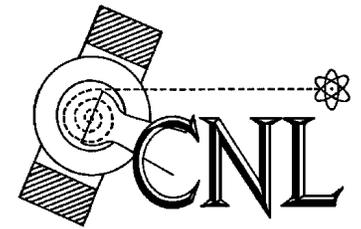
Commercial System Advantages



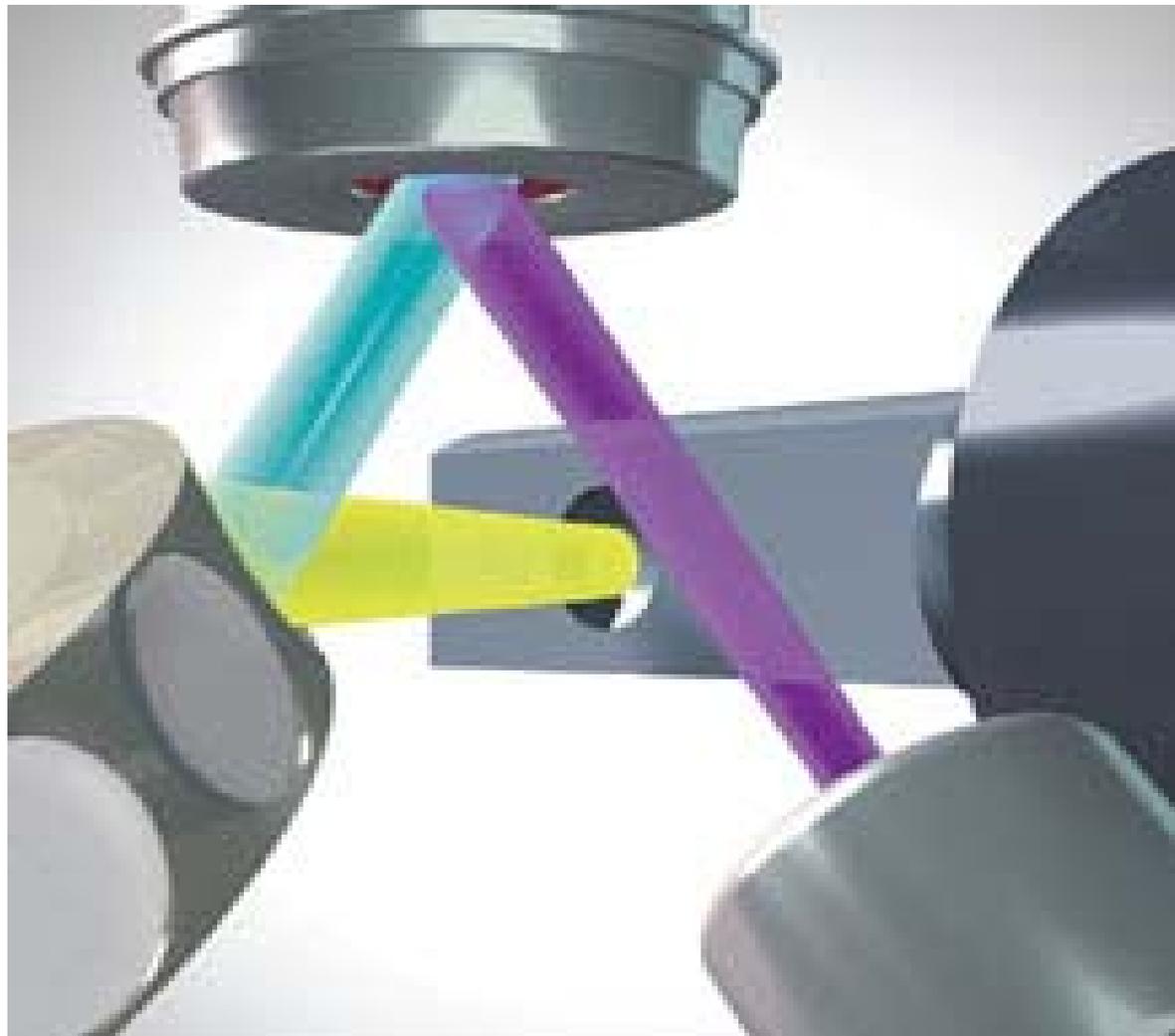
- Data stability over time
- Fully developed, tested, & documented system
- Professional, user-friendly work environment
- Staffing depth
- Well-suited to running replicates & standards



Secondary Targets

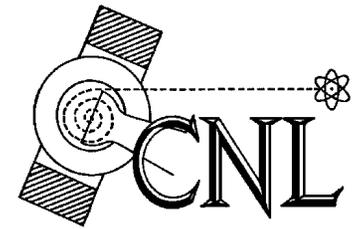


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Sample Cups are Standard

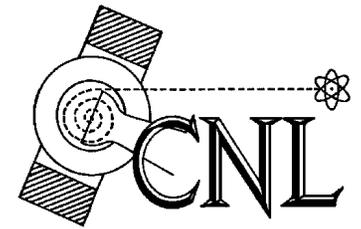


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Standard Sample Cups Limit Throughput

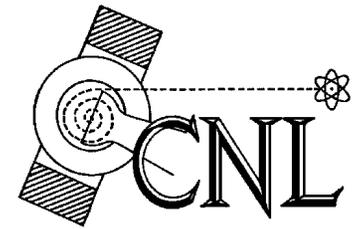


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New Crocker-Designed Sample Trays Increase Throughput

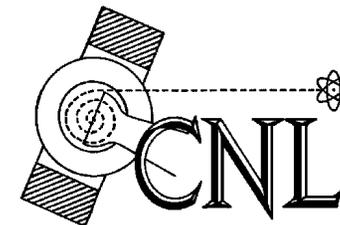


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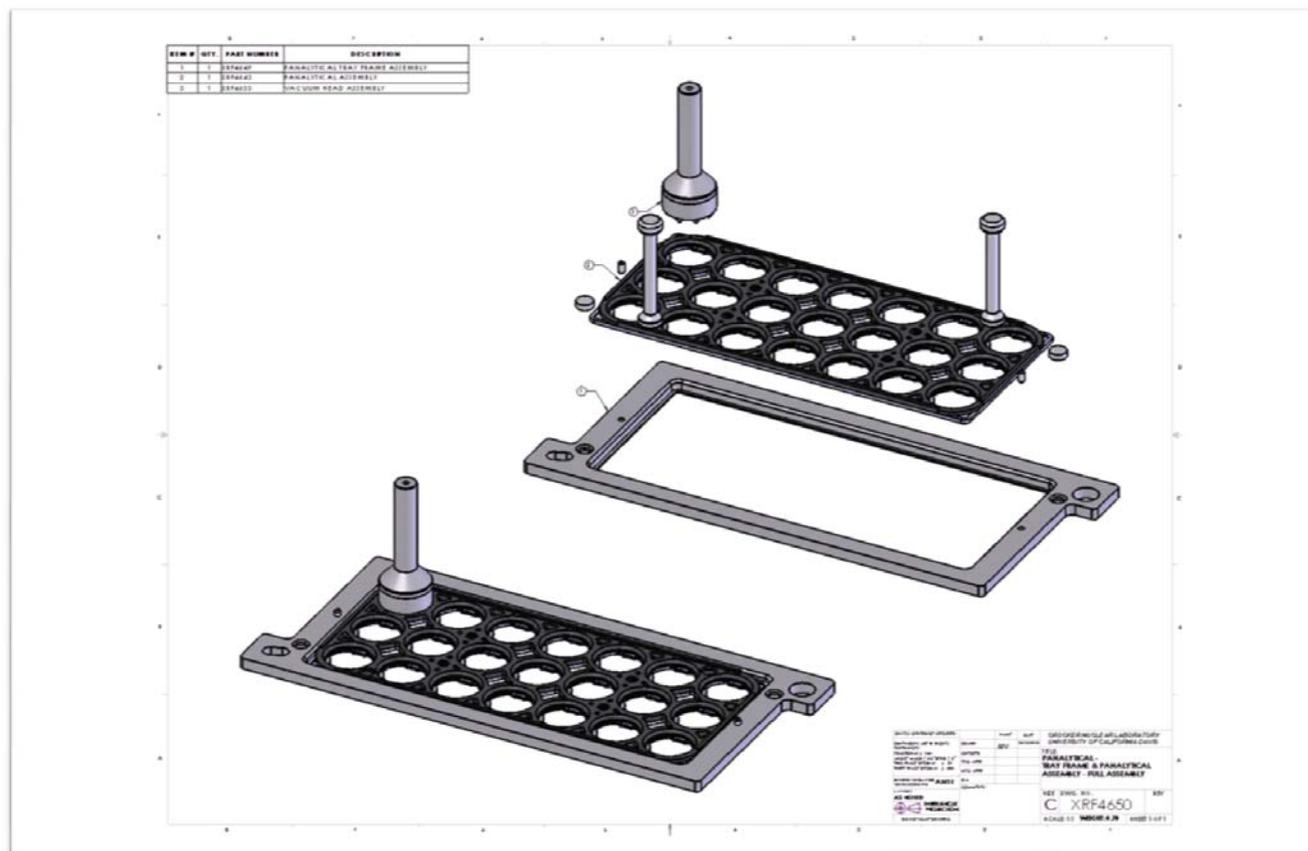




A Crocker-designed Vacuum Head Picks Up the Filters

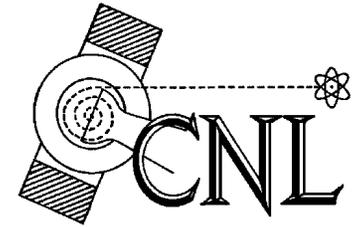


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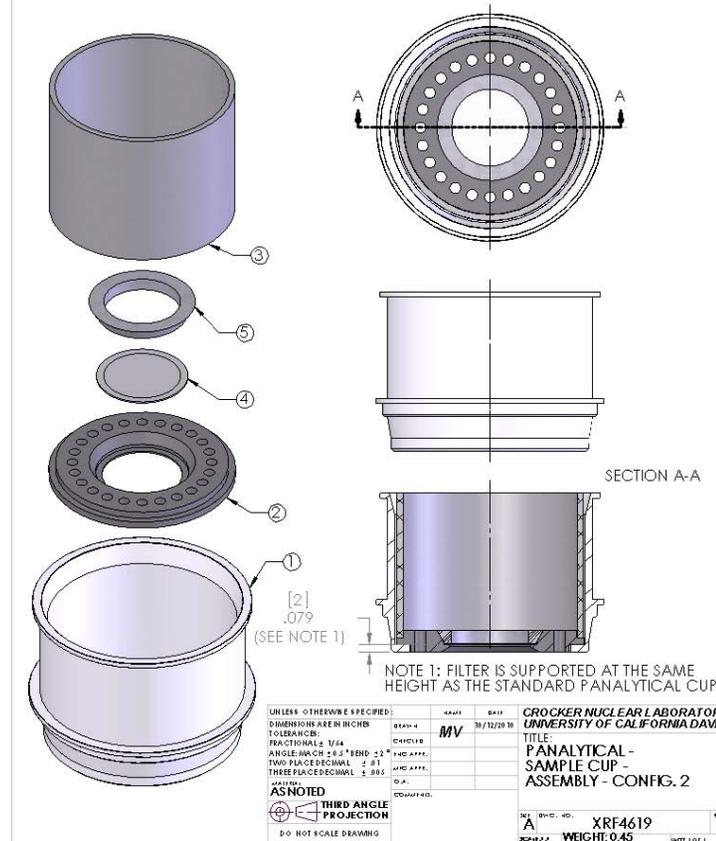


Each Filter is Placed in a Single Sample Cup for Analysis



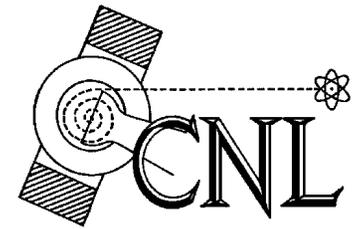
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ITEM #	QTY.	PART NUMBER	DESCRIPTION
1	1	XRF4602	SAMPLE CUP - MODIFIED
2	1	XRF4620	SAMPLE CUP FILTER SUPPORT - CONFIG. 2
3	1	XRF4603	SAMPLE CUP SHIELD - MODIFIED
4	1	XRF4606	25mm FILTER
5	1	XRF4618	FILTER RETAINING RING - CONFIG. 2





Our Machine Shop Made the Modifications Possible

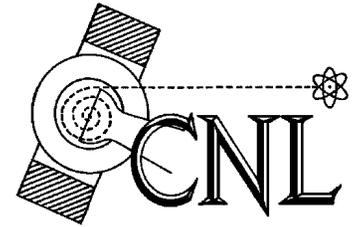


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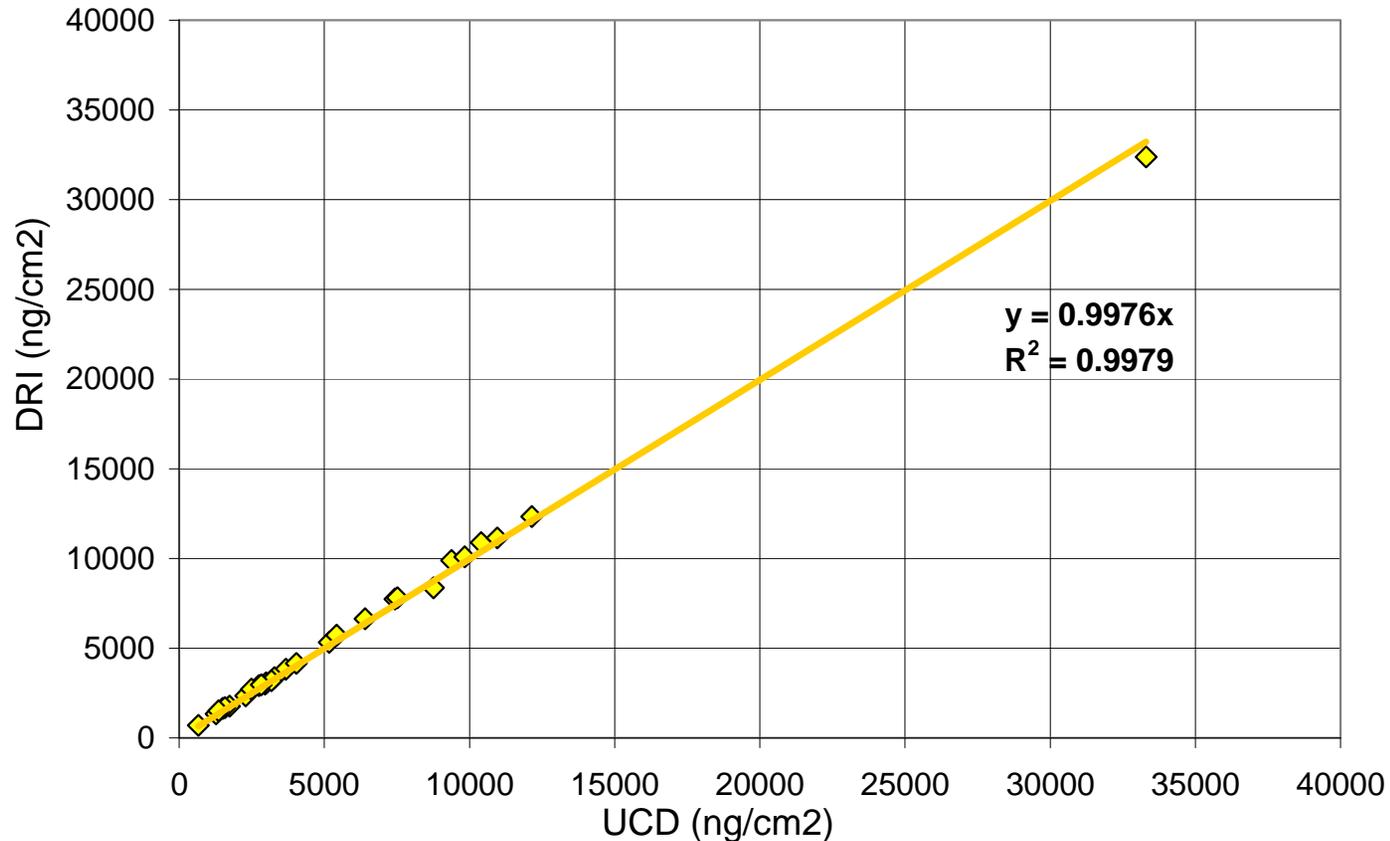


Old & New Systems Agree for S When Calibrated Similarly



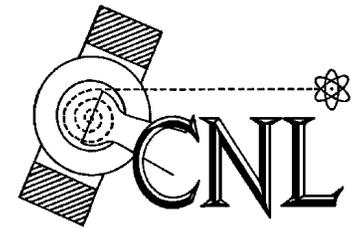
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XRF Sulfur: DRI vs. UCD



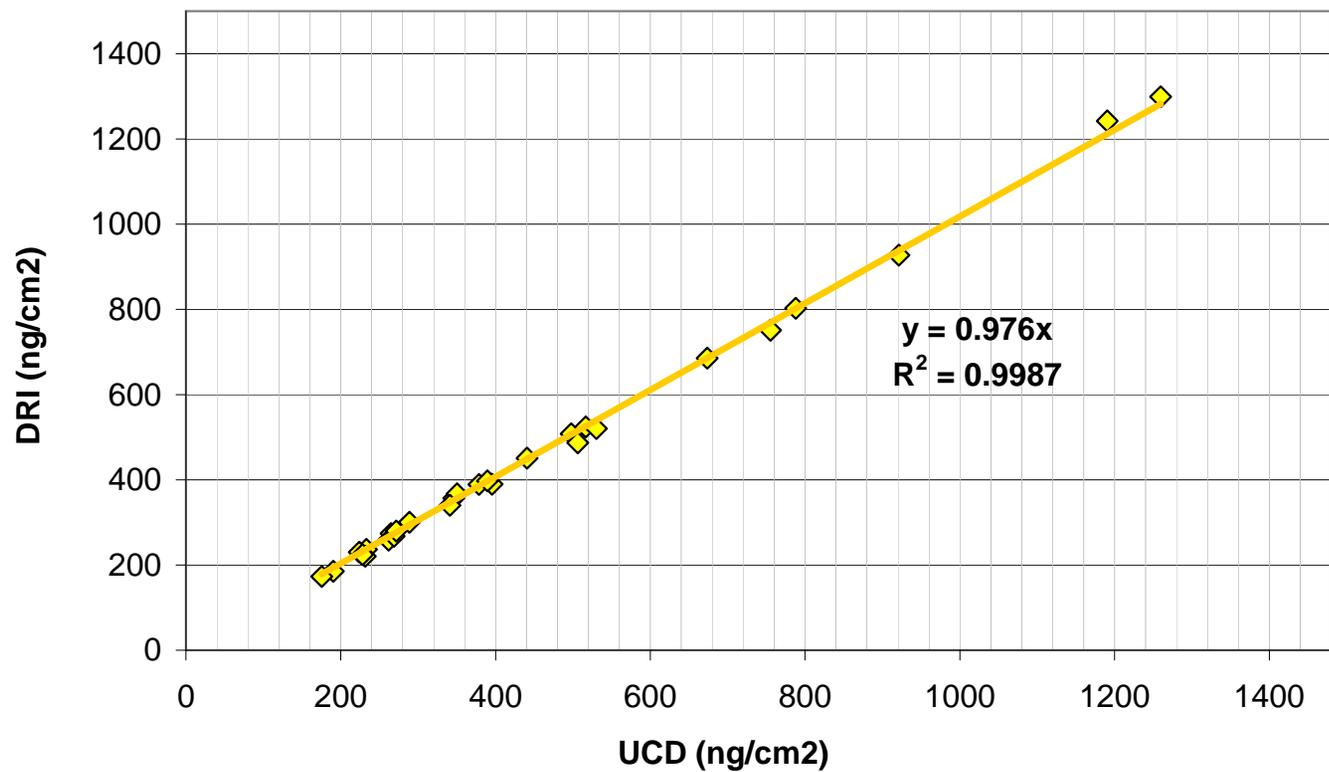


Other Elements Also Agree



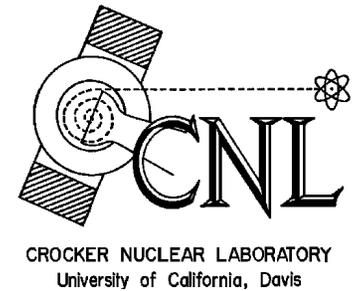
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XRF Potassium: DRI vs. UCD

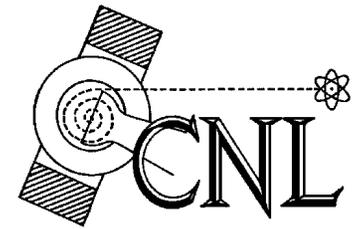




Upcoming Tests



- Exploration of system parameters to choose our routine protocol
- Reanalysis of IMPROVE filters to characterize differences between old & new systems
- Reanalysis of ~15 years of filters on old & new systems for 3 selected sites
- Assessment of best approaches for calibration

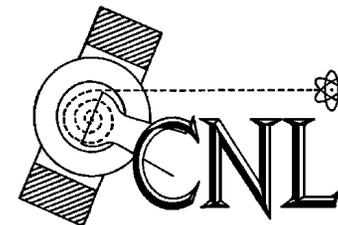


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WEIGHING & SAMPLE HANDLING



Mettler XP-6

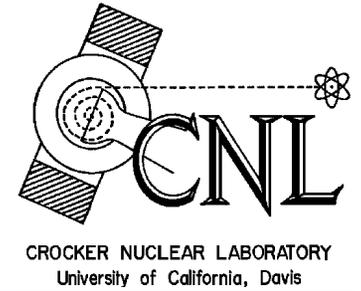


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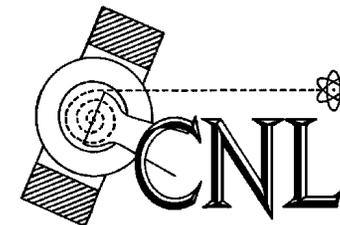
Key Features



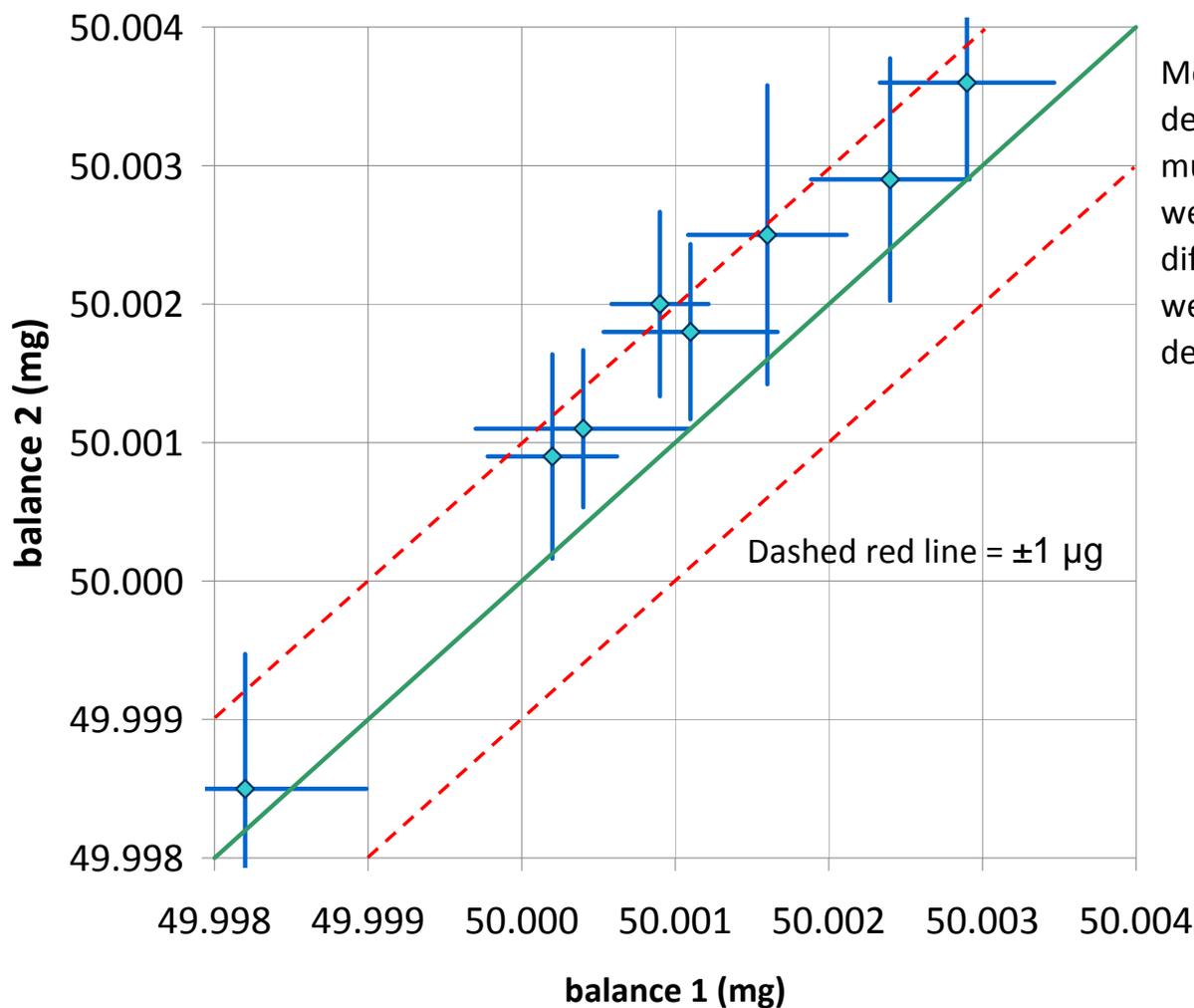
- Readability & repeatability ~ 1 μg
- Settling time < 8 seconds
- Durable – Not subject to damage like our old hanging-pan balances
- Fully compatible with SQL database



The New Balances Agree to Within $\pm 1 \mu\text{g}$

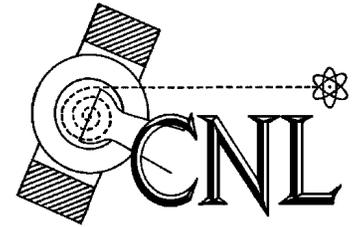


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Weighing Table

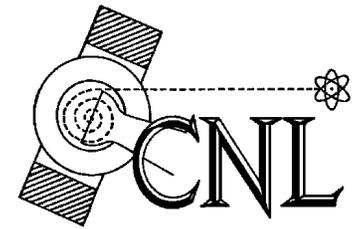


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Teflon[®] Filter Barcodes



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