

Current High-Dose Activities

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NIST

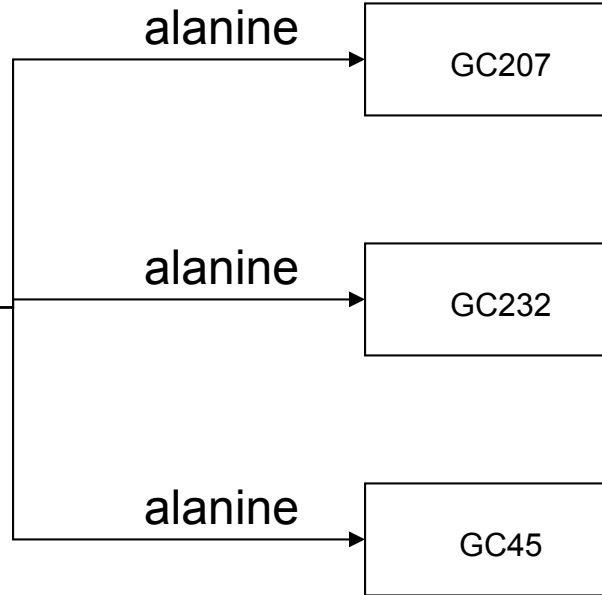
Part 1/3: IMS Proposal

- The NIST Innovations in Measurement Science Program funds “innovative and creative measurement science ideas”.
- Encourages submissions that are “high-risk innovative research with potential for substantial breakthroughs that significantly impact measurement science.
- Awards of approx. \$1M/y for up to 5 years.

High Dose Standard & Services



Gray realized with water calorimeter in Vertical Beam
Transfer of dose rate made by alanine dosimeter ratios in terms of signal/second.

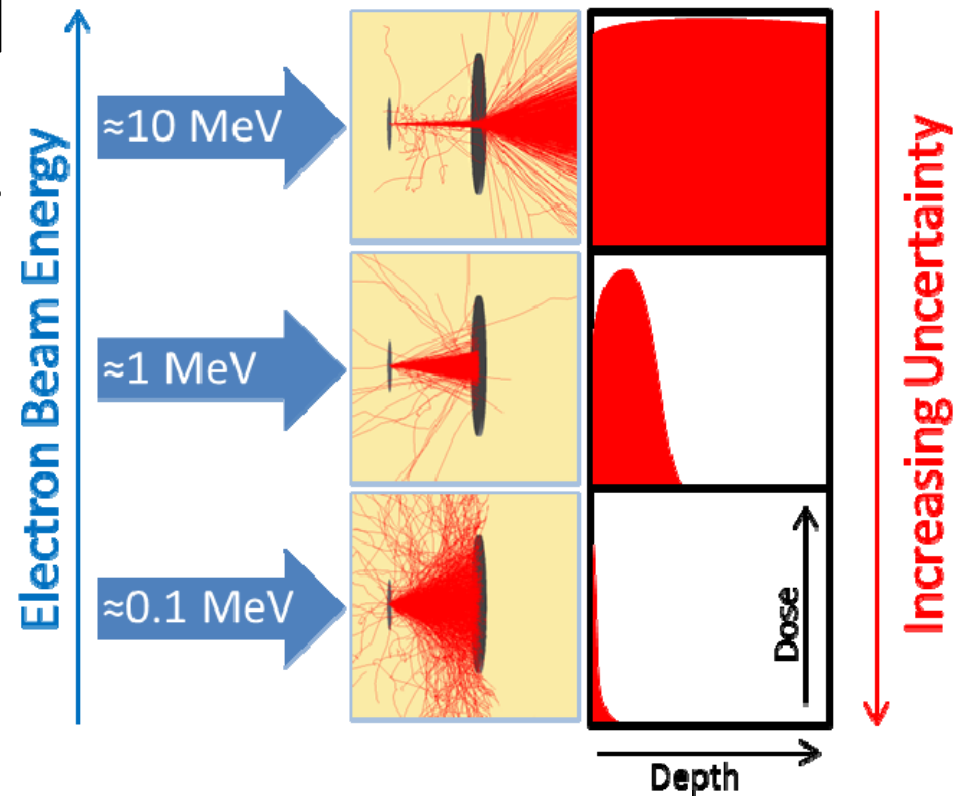


Problem

- NIST Gammacells must be replenished and the future cost & availability of Co-60 installations are uncertain.
- Heightened security measures and their maintenance costs are not expected to decrease.
- Propose to establish a new primary standard.

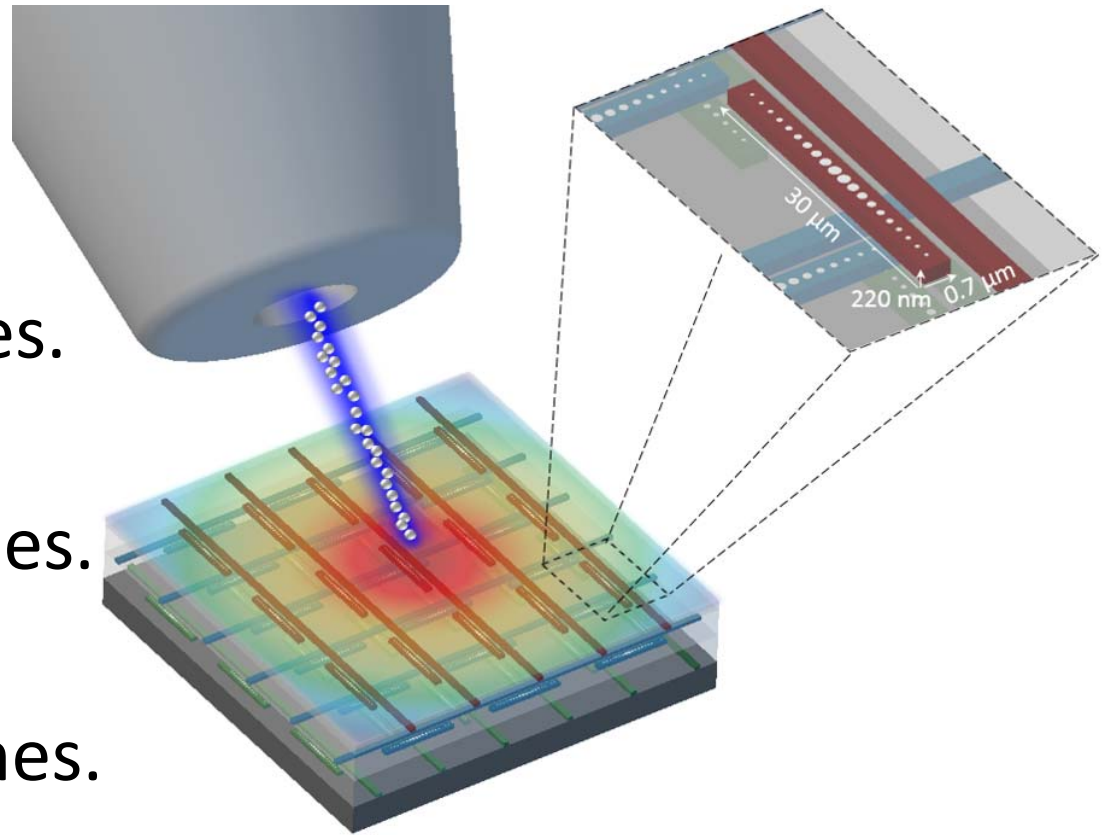
The Electronic Gray

- Build a suite of EB's and calorimeters that will service the full range of applications.
- Will require a fresh approach with innovative measurement methods and materials.



e-Gray Leveraging Expertise

- Partnering with the Sensor Sciences Div.
- History of advanced thermometry devices.
- Skilled in nano-fabrication techniques.
- Not bound to traditional approaches.



Plan



| Energy(MeV) | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
|-------------|------------------------|--------------|-------------------------------|------------------------|-----------------------|
| High (10) | Design/Test | Test/Improve | Establish equivalence | Establish as Reference | Expand Capabilities |
| Medium (1) | Design/Test | Test/Improve | Establish equivalence | Establish as Reference | Expand Capabilities |
| Low (0.1) | Acquire EB Accelerator | Design/Build | Build/Test Go/No Go | Test/Improve | Establish equivalence |

Status

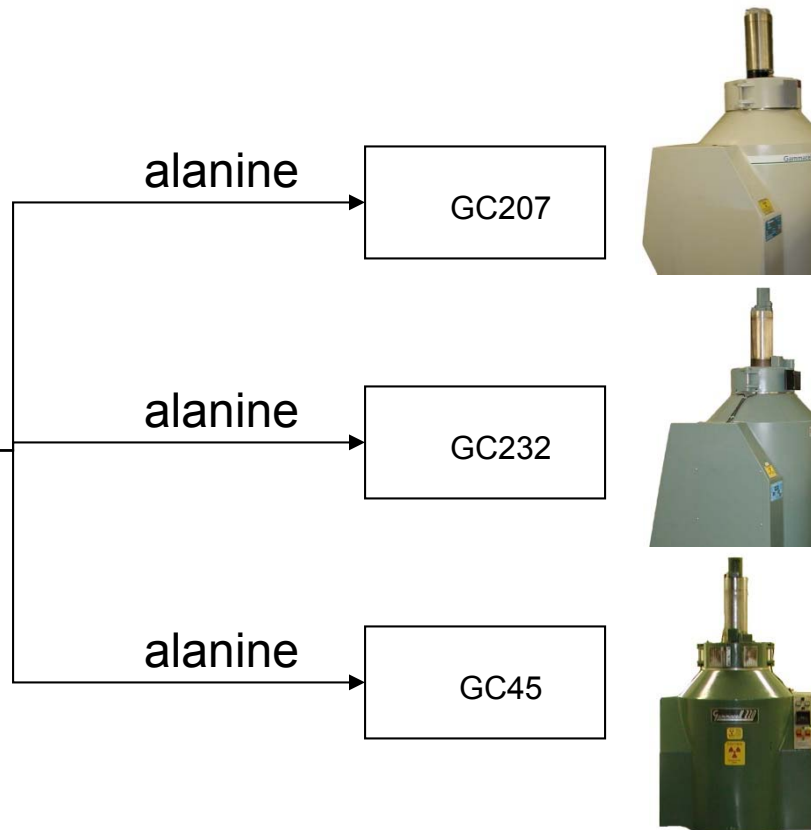
- Proposals sent through Division to PML who then selects four from across all PML Divisions to ultimately be sent to Director for consideration.
- 40 proposals sent to PML.
- *e-Gy ranked #1 of 12 selected for 5 min pitch.*
- Selected as 1 of 6 to submit 4 page proposal.
- Proposal selected to Final Four for Director.
- Director will select a subset for oral presentations in September with awards in October.

Part 2/3: Source Ratio Checks

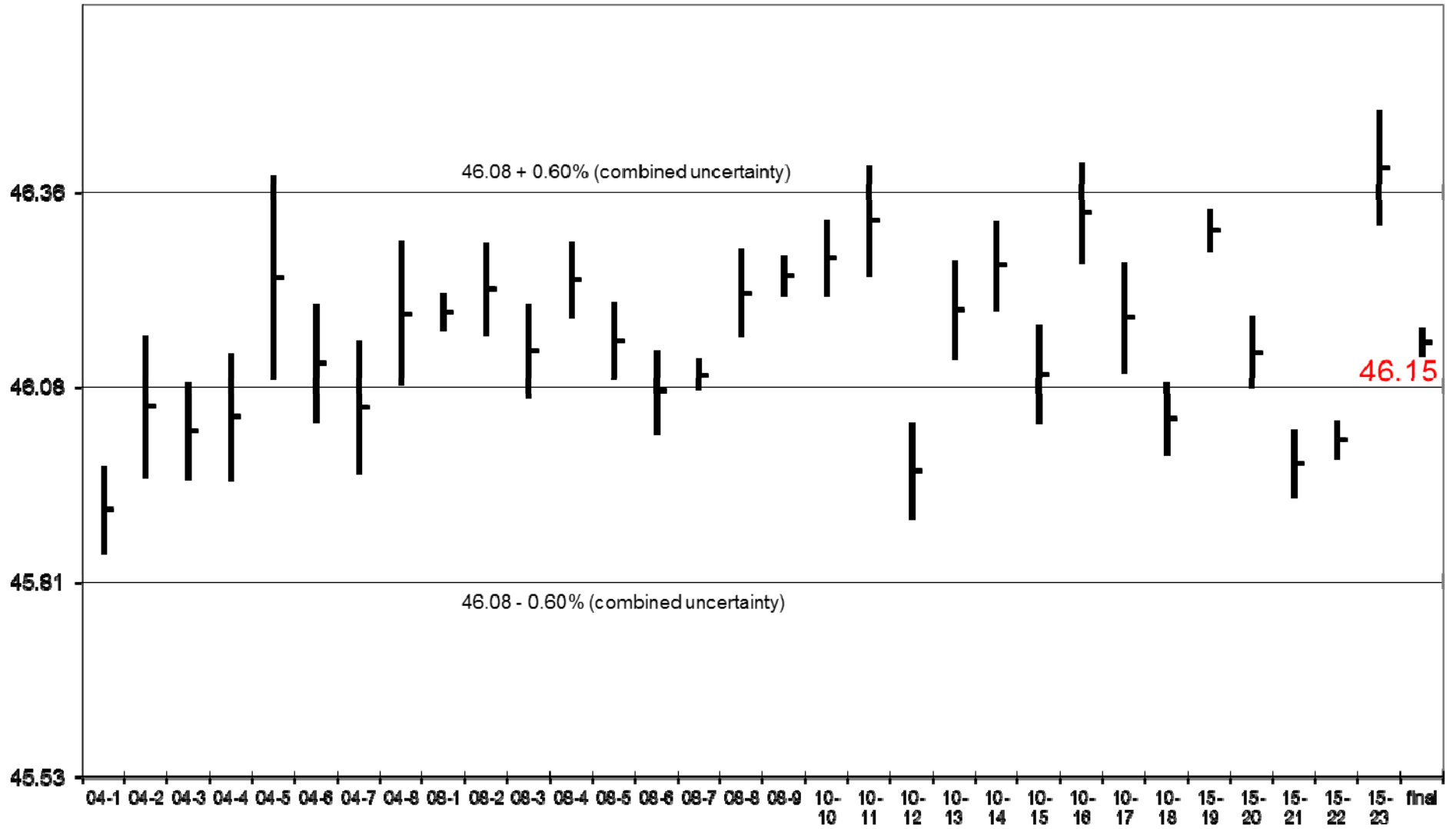


Transfer of dose rate made by alanine dosimeter ratios in terms of signal/second.

Source rate ratios are checked periodically as part of our Quality System service maintenance plan.



GC207 Rate to Pool Rate Ratio 2004,2008,2010,2015 Data



Implications

- 11 years of comparisons.
- Cobalt sources unchanged.
- Irradiation geometries unchanged.

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- Cobalt sources unchanged.
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- Same dosimeter batch!
- GammaService/FWT batch made in Sept 2003.
- Full mass range from 64.5 mg to 67.5 mg
- Data establishes a shelf life of 12 years for alanine dosimeters.

Part 3/3: EPR Dosimetry Comparison

Internal Reference

- Internal EPR reference that responds to subtle changes in the EPR spectrometer sensitivity, day-to-day & pellet-to-pellet.
- Check system calibration daily with check standards.
- In-situ normalization.
- No daily adjustments.
- Many years of data.

Check Standard Adjustments

- Systems without internal standards depend on check standards to capture daily variations in spectrometer sensitivity.
- Adjustments are made to dosimeter measurements based on the check standard response.

Current Calibration from 2012

- Four years of internal reference data that captures seasonal and daily spectrometer sensitivity variations.
- Four years of response data (alanine/ruby ratio).
- Plan to retroactively create an alanine-only calibration with the same data, then mock test a system that relies on daily check standard adjustments.

Comparison

- Data will compare internal reference system performance to systems that operate without an internal reference
- Offers insight into the uncertainty associated with daily corrections with alanine check standards.
- I assume that the lack of information on this aspect of the measurement system is due to the difficulty in capturing it as a Type A.

So long, and thanks for all the fish.