

Overview of Equipment commonly in use

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Listing of common equipment

- Superficial and Orthovoltage x-ray machines – traceable calibrations next slide
- $^{137}\text{Cesium}$ irradiators (problem since Homeland Security wants to remove them)
- $^{60}\text{Cobalt}$ irradiators
- There are NIST traceable calibrations to cesium, cobalt and x-ray beams.

NIST and UW Beams Matched

NIST BEAM QUALITIES

UW ADCL BEAM QUALITIES

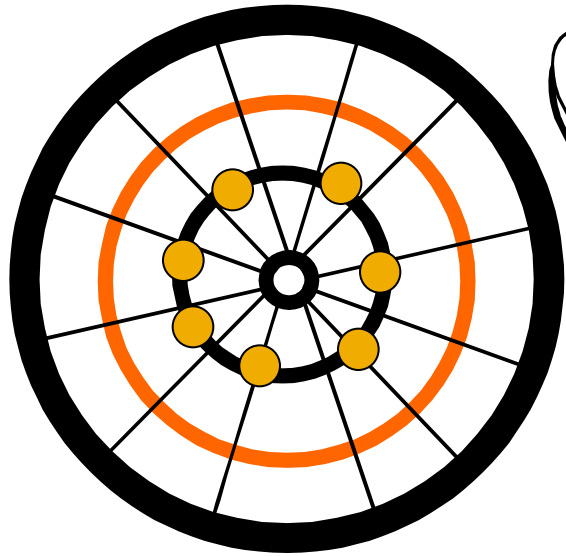
| BEAM CODE | HVL (mm Al) | HC | BEAM CODE | HVL (mm Al) | HC |
|-------------------|----------------|----|----------------------|----------------|----|
| L30 | 0.22 | 60 | UW30-L | 0.22 | 56 |
| L40 | 0.49 | 57 | UW40-L | 0.49 | 60 |
| L50 | 0.75 | 58 | UW50-L | 0.75 | 61 |
| L80 | 1.83 | 58 | UW80-L | 1.83 | 58 |
| L100 ¹ | 2.8 | 59 | UW100-L | 2.80 | 58 |
| M20 | 0.152 | 79 | UW20-M | 0.153 | 79 |
| M30 | 0.36 | 64 | UW30-M | 0.354 | 63 |
| M40 | 0.73 | 66 | UW40-M | 0.73 | 64 |
| M50 | 1.02 | 66 | UW50-M | 1.02 | 64 |
| M60 | 1.68 | 68 | UW60-M | 1.68 | 66 |
| | | | UW80-M ² | 2.96 | 68 |
| M100 | 5.0 | 72 | UW100-M | 4.98 | 72 |
| | | | UW120-M ² | 6.96 | 78 |
| M150 | 10.2 | 87 | UW150-M | 10.2 | 87 |
| M200 | 14.9 | 95 | UW200-M | 14.9 | 94 |
| M250 | 18.5 | 98 | UW250-M | 18.5 | 98 |
| S75 | 1.86 | 63 | UW75-S | 1.86 | 63 |
| S60 | 2.8 | 75 | UW60-S | 2.82 | 76 |

All beams are matched as closely as possible to available NIST beam qualities.

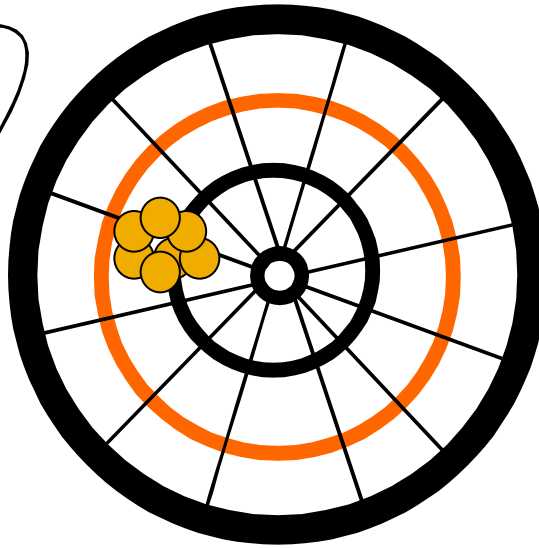
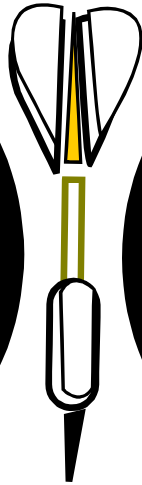
Parameters

- Remember it is a bremsstrahlung spectra: characterization is by kVp, HVL and HC
- HVL_2 is the second half value layer
- Homogeneity coefficient (HC) is the ratio of the first HVL to the second. It gives a relationship of the beam energy output. An $HC = 1$ would be a single energy beam. For example, cesium has an $HC = 1$ since it has one energy, 662 keV.

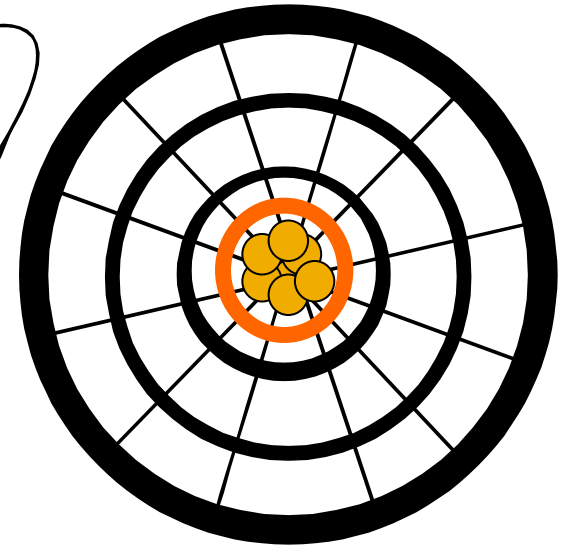
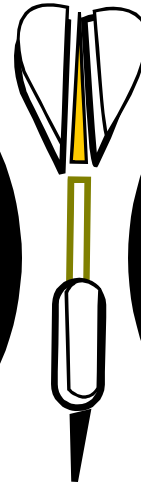
Accuracy and Precision



**Accurate but
not precise**



**Precise but
not accurate**



**Precise and
accurate**

Beam size

- The beam size you are working with may limit your dosimetry
- There could be partial volume effects of your measuring device
- Know what you are measuring

Summary

- Pay attention to the energy and HVL of the beam you are using.
- It affects your dosimetry