GENERAL DISCUSSION

Wilson: How did you deal with the peculiar geometry of the synchrotron emission? Were you able to fill your photometer or was it necessary to build up the calibration by a spatial scan?

Bless: We do not collimate the radiation but rather carry out a point-by-point calibration over the aperture of the detector system.

We calibrate small filter photometers as a whole in the synchrotron radiation beam on a point-by-point basis since the radiation bundle is not collimated. These photometers are to be flown in Aerobees to check the OAO calibration.

Carruthers: The early thermocouple calibrations of sodium salicylate indicated a 15% lower response at 584 Å relative to 1216 Å. We recently have also confirmed this by comparison of measurements using a windowless, parallel-plate standard ionization chamber, with argon (100% photoionization at 584 Å) and with methyl iodide (87% at 1216 Å), with measurements of the same lines using a sodium-salicylate coated photomultiplier.

Davis: The Smithsonian Astrophysical Observatory has used both sodium salicylate and thermocouples in deriving our Celescope-OAO calibration standards. The quantum efficiency of sodium salicylate depends upon deposition techniques, and should not be relied upon as a standard. Our comparison with the Wisconsin calibration gives agreement to within 3% at all wavelengths between 1000 and 3000 Å. We use standard lamps to maintain the calibration of our thermocouples and other standard detectors.

Bless: I would like to mention work being done by Tim Fairchild of our group in Wisconsin. We use as a standard source synchrotron radiation from a storage ring rather than from a synchrotron which in our case simply injects a batch of electrons into the ring at 50 MeV. The ring then accelerates the electrons to any energy up to 245 MeV. The advantages of a storage ring over a synchrotron are the long lifetimes (hours) of the particles in the ring thus providing a stable source of UV radiation; most importantly, the number of electrons radiating synchrotron radiation can be accurately determined. This source therefore gives an energy distribution of known absolute intensity, rather than just a relative distribution. The number of electrons is found by observing the decay of the last several (e.g. 30) electrons in the ring by noting the incremental decrease in intensity as each electron leaves the beam. This process can be followed to the last electron. It is then a simple matter to calculate the number of electrons (typically several hundred) circulating in the ring when the calibration was made.

So far, this source has been used to calibrate photomultipliers and interference filter photometers with half-widths of 200–300 Å in the 2000–3000 Å region. The sys-

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tem to be calibrated is mounted in a tank attached tangentially to the ring and the sensitivity mapped out point-by-point. Since the beam is highly polarized, calibrations are carried out with the detector system at various orientations about the longitudinal axis.

By the end of this summer it will be possible to extend calibrations down to 1000 Å.

Clark: What vacuum do you have in the storage ring?

Bless: 10^{-9} mm.

Henize: Boldt concentrated entirely on 'source-type' calibration methods whereas the practical calibration of flight instruments still seems to depend largely on 'detector-type' calibration. Can someone discuss the relative accuracies of these two methods?

Boldt: My report was related to intensity-*standards*, i.e. to instruments which are stable and reproducible with respect to their intensity or efficiency. I don't know any detector which is stable in its efficiency for more than a few months. Consequently I had to restrict myself to sources.

Bonnet: I wonder whether such big ground based calibration sources can be used as onboard calibration standards.

Bless: We use on OAO $\frac{1}{2}$ inch diameter Cerenkov sources as calibration checks. These are mounted in the photometer filter wheels and check the performance of the detector and electronics. They have performed very well.