set at the approximate angle, the reflection found and then the tubes were repositioned to give the highest counting rate. Tests show that displacing the counting tubes by 0·8° from the 79·3° position changes the peak R by 2–½ sec. However we will go to scintillation counters when we can get small enough ones. We then count for a fixed time, generally 20 sec., increase R by 20 sec. of arc and count for 20 sec., etc. Generally we do not correct for Geiger tube dead time because this does not shift the peak although it flattens it. If we join successive points by straight lines and then form a curve from the points midway between these points and the opposite connecting lines (at the same intensity level) we find that this derived curve is nearly straight. It cuts the profile at a point we shall call 'the midchord peak.'

A calibration supplied with the clinometer shows irregular errors as high as 5 sec., with a symmetry plane near a reading of 50°. Hence to minimize errors we make 50° the midpoint between the first pair of curves. This is done by turning the crystal carrying shaft in its hole in the clinometer shaft and relocking it. We then repeat with 50°+90° as a midpoint, etc., giving four pairs of curves distributed evenly about the circle. As a test case we take silicon as shown in Table 1.

(The temperature correction was made using the expansion coefficient $2{\cdot}33\times10^{-6}$ per deg.cent. This is the value found by D. Gibbons of Bell Labs. by an interferometer method (Gibbons, 1958).)

Discussion

If we weight these three values proportionally to tan θ/s.d. we get 5·4197695 kXU. The most reliable of the three measurements, the (444), differs from this by less than a part in a million while the worst differs by less than four parts in a million.

The peak widths are roughly correct for a primary beam width of 0·8 min. at half max plus a 'wavelength spread' $300\times10^{-6}\tan\theta$.

In computing the standard deviations we have treated the systematic but compensating errors as random. This should be conservative.

This instrument can be used to measure directional affects such as a comparison of d_{100} in the growing direction of a cubic crystal with d_{010} perpendicular to the growing direction. We have used crystals but little over 1 mm. square and also crystals half an inch in diameter.

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International Union of Crystallography

Conference in Stockholm, 9-12 June 1959

The Precision Determination of Lattice Parameters

As has been reported in *Acta Cryst.*, **12**, 1054–1055 (1959), the Commission on Crystallographic Apparatus held a very successful series of conferences in Stockholm during the period 9–12 June 1959. It had been arranged that the papers presented at the Conference on Precision Lattice-Parameter Determination would be published as a group in *Acta Crystallographica*. However, about half of the speakers have not provided manuscripts for publication, and the eight papers printed below are all that are availabe in the form in which they were presented. They have been prepared for publication by the Chairman of the Commission on Crystallographic Apparatus (Dr W. Parrish), and the Editors of *Acta Crystallographica* are grateful for his help. One other paper appeared in expanded form (p. 814).

The final report of the Commission on its lattice-parameter project is published on p. 838 of this issue.

Acta Cryst. (1960). **13**, 818

Some sources of error in precision determination of lattice parameters.

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The absorption correction

The displacement of Debye–Scherrer lines as well as of reflections of a single rotating crystal due to absorption of the X-ray beam by the sample follows from a simple geometry. Hadding (1921) derived an expression for the correction $\Delta\theta$ of the Bragg angle θ assuming that the sample was completely opaque: