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makes it possible to determine $p(W)$ with a resolution in W better than 0.01 J. The $p(W)$ curve thus determined is largely unaffected by "conditioning" effects which destroy the statistical independence of consecutive pulses,[1] because members of the sample population in each energy bin rarely represent consecutive pulses. In fact, the same apparatus may be used, with appropriate data analysis, to measure the statistical correlation of the outcomes of consecutive pulses (of different energies) as a function of gas flow rate or laser pulse rate. In particular, the dependence of the correlation on laser pulse rate under zero-flow conditions determines the "lifetime" of the physical agent responsible for the correlation.

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Improved technique for shaping long fragile alkali halide crystals*

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An improved method of chemically shaping very fragile long crystals into cylindrical shape by the chemical lathe has been developed and successfully applied for shaping meter-long LiF and NaCl single crystals. The variation of the diameter of the finished cross section is less than 0.1 mm.

In high-precision length measurements,[1,2] crystals as long as 1 m are needed to improve accuracy. Obtaining such crystals was found to be difficult. However the Crystal Growing Laboratory at Cornell University successfully produced LiF and NaCl single crystals in lengths greater than 1 m. As produced, the crystals are of nonuniform diameter and shape along the axis with a diameter of approximately 1 cm. The crystals must then be cut and shaped so as to be properly mounted in the measurement system. Needless to say, such crystals are extremely fragile. Most conventional preparation techniques are obviously unsatisfactory. Sandblasting[3,4] was thought to be a solution, but required excessive time and regenerated the original crystal shape regardless of the amount of material removed. Chemical etching was tried and found to be satisfactory. As illustrated in Fig. 1, a chemical lathe was fabricated.

The crystal is aligned so that its axis coincides with that of the holding fixture. The holding fixture is a tube (copper in this case) with two lightly force-fitted sleeves near each end. The crystal is held at each end in the

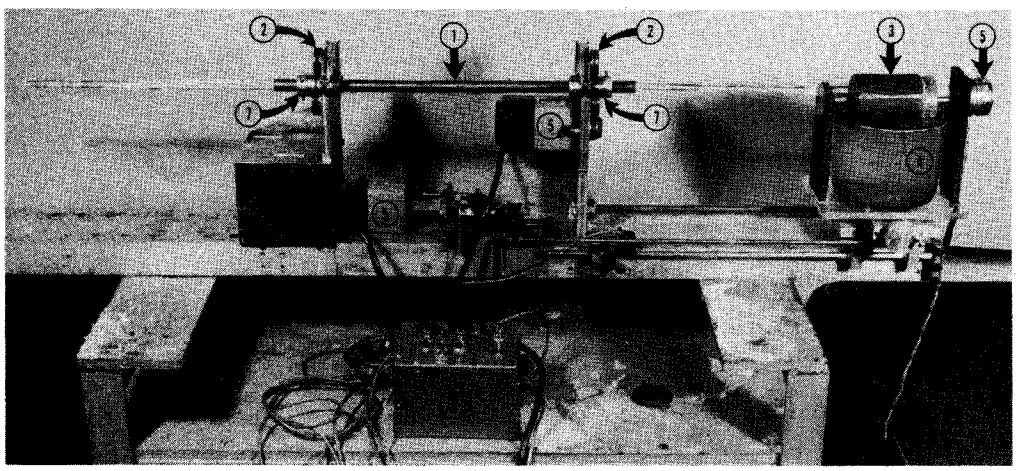

FIG. 1. Overall view of the chemical lathe: (1)—holding fixture with crystal in position; (2)—ball bearings; (3)—rotating drum; (4)—chemical container; (5)—motors; (6)—electrical controls; (7)—sleeves.

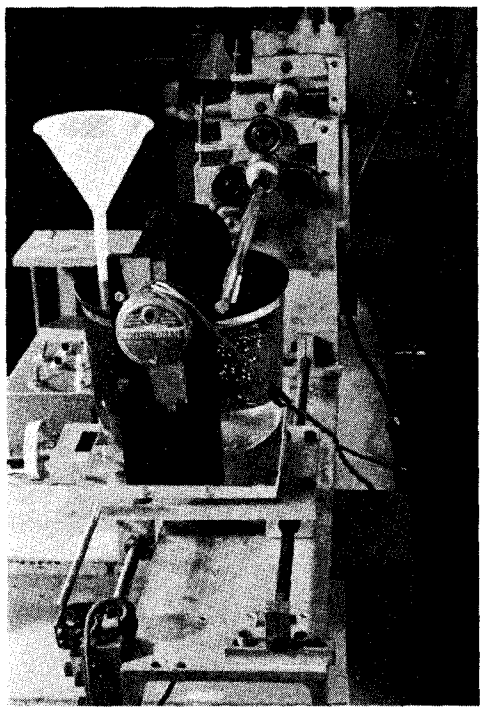

FIG. 2. End view of chemical lathe showing bearings surrounding sleeves.

holding fixture by three nylon screws. This unit is then supported between ball bearings on the chemical lathe. There are three ball bearing units surrounding each sleeve, as shown in Fig. 2. Each sleeve has a shoulder as shown which rides on the bearings. The top bearing is mounted in a swinging holder for easy access and for adjusting the compression of the bearing against the sleeve. Cutting of the material which extends beyond the holding fixture is then accomplished by the etchant, which is held in the chemical container. (In the present application there was no need to machine the center section.) The etchant is transferred by polyurethane foam mounted on the partially immersed rotating drum. The crystal also rotates while the polyurethane foam is gently in contact with the crystal. For a finer, more uniform, finish the polyurethane foam is replaced by a fine cloth such as velvet. The etchant used was a 40%–50% pure fluoboric acid for the LiF crystal and 80% methanol to 20% water for the NaCl crystal. Crystals were finished with a diameter of 6.3 mm and the deviation in diameter as well as the deviation from concentricity did not exceed 0.1 mm.

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Simple masking technique for shaping magnetic epitaxial garnet films for ferromagnetic resonance*

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A simple and inexpensive technique is described by which disks of magnetic epitaxial garnet films may be chemically shaped. Using silicone rubber adhesive as a mask, disks of film as small as 0.05-cm diameter, suitable for ferromagnetic resonance studies, may be easily produced.

It has been known for a number of years[1] that for use in exchange spin-wave resonance studies, it is often desirable to shape samples of thin (1- to 5-μ) epitaxial garnet films by chemical etching rather than by mechanical means. Shaping of the film by chemical etching may be necessary because mechanical cutting produces stresses and chipping at the edge of the film, resulting in nonuniform demagnetizing fields along its perimeter. In such irregular samples, a complicated and irreproducible spectrum of magnetostatic modes, which can obscure and distort the exchange spin-wave spectrum, results. These magnetostatic modes[2,3] are normal modes of variation in the film plane of the transverse magnetization and are therefore sensitive to the magnetic boundary conditions at the edge of the film. The standard technique for producing small circles of magnetic garnet with a geometrically uniform perimeter is to deposit a circular SiO_2 mask, etch away the unwanted garnet in hot phosphoric acid and finally remove the SiO_2 mask by a buffered HF solution.[4] The SiO_2 mask is formed