increase. Fluctuations in emission angle from shot to shot as well as the extra curves observed experimentally could be explained by the $a^2/2l^2$ and $4\Delta K/K_1$ terms in Eq. (2) which vary for different filaments.

This process is quite general and we have observed similar curves in other glasses, calcite, and liquids such as methanol and acetone. Borosilicate glass is chosen for specific analysis because accurate values of the refractive index are available and because there are no sharp vibrational Raman lines which would interfere with the interpretation of a four-photon nondegenerate process. We do observe Class-II Raman rings from calcite and the liquids.

The four-photon coupling mechanism in borosilicate glass is surely electronic, but in liquids a possible coupling mechanism could be the optical orientational Kerr effect, although this mechanism appears to be ruled out since the spectral extents in liquids are thousands of wave numbers which is much greater than the inverse of the orientational relaxation times. In view of experimental complications—i.e., short intense pulses, filaments, self-phase modulation—agreement between experiment and theory is excellent.

Four-photon parametric oscillation should be enhanced by placing resonator mirrors at the Stokes or anti-Stokes emission angles. Four-photon processes are probably present inside Q-switched and mode-locked Nd:glass lasers and thus influence laser action.

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COMMENTS ON "LORENZ-FUNCTION ENHANCEMENT DUE TO INELASTIC PROCESSES NEAR THE NÉEL POINT OF CHROMIUM"*

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A peak has been reported in the thermal conductivity (and hence the Lorenz function) of Cr at the Néel temperature. The investigators reporting this effect have ignored a considerable body of previous results on several chromium specimens. None of the previous results indicate a peak in the thermal conductivity. We feel that the effect is suspect and may be associated with defects in experimental technique.

A recent paper by Meaden, Rao, and Loo[1] reports the existence of a sharp peak in the Lorenz function of chromium at the Néel temperature. They propose that this effect is caused by an enhanced electronic thermal conductivity from a reduction of electron scattering by phonons. MRL imply that this effect was not observed in our prior measurements[2,3] on three Cr samples either because the measurements were made without "quite high resolution and precision" or because of the larger temperature differences which we employed. Until some stronger evidence is reported, we feel that their results are suspect for several reasons.

Although their electrical resistivity (ρ) values are in good agreement with the data which we reported for our "A" sample, the thermal conductivity (λ) results disagree as shown in Fig. 1. As noted on Fig. 1 we made two series of measurements with gradients of approximately 0.4 deg cm^{-1} (approximately 1.4-deg total ΔT between temperature sensors) and 1.4 deg cm^{-1} (approximately 5-deg ΔT). All our data are within $\pm 0.7\%$ of a smooth curve, show no dependence

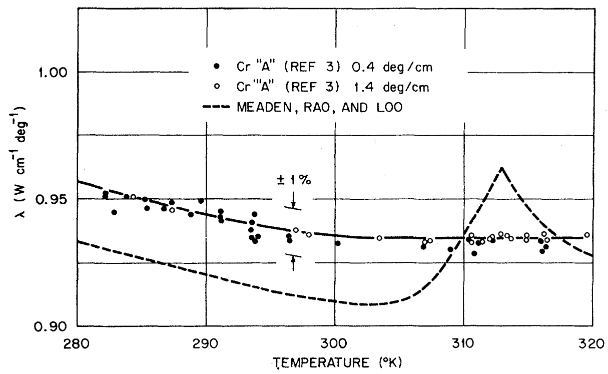

FIG. 1. Thermal conductivity of chromium from one sample studied by Moore, Williams, and McElroy (Ref. 3) and from results reported by Meaden, Rao, and Loo (Ref. 1).

on ΔT, and we did not observe the approximately 6% peak reported by MRL.

A description of MRL's technique has not been published and, although they mention its good resolution, neither accuracy nor presicion statements are given. This is surprising in view of the fairly small effect they are discussing and the difficulties associated with making good λ measurements. In contrast, our device[4] has demonstrated agreement to well within 1% with thermal-conductivity research equipment employed at the National Bureau of Standards and the National Research Council of Canada. (See Ref. 4 for a comparison of Cu results and Flynn and O'Hagan[5] for a comparison of Pt results.) We feel that our data are accurate and of sufficiently high resolution to resolve the peak reported by MRL if it were real.

In addition, all the gradients we employed were too small to effectively average out the peak. Any thermal conductivity effect observable only with a small gradient would imply a gradient dependence for the effect and, exclusive of any smearing or averaging effect by the gradient, would represent a breakdown of Fourier's law.

Although MRL state that theirs is the first observation of a peak in the Lorenz function of a magnetic material at its magnetic transition, a similar effect was reported by Richter and Kohlhaas[6] for iron. The behavior in iron was, however, later shown to be a characteristic of their measurement technique.[7]

One other aspect of the paper deserves mention. The equation which MRL present as fitting their results for λ above 220 K to within 1% agrees almost exactly with one proposed by us[3] two years ago as fitting the thermal conductivity of chromium from 200 to 1300 K to within ±3%. This equation has been discussed in detail by Williams and Fulkerson.[8]

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