Figure 23 shows a simultaneous scan of the $\hat{\varepsilon} \parallel \underset{\sim}{E}$ transition F = 1→1 and the $\hat{\varepsilon} \perp \underset{\sim}{E}$ transitions F = 1→0, 1. Both etalons are used in the laser, and the linewidth is estimated to be 2 GHz. For each differential screw setting, 200 laser shots were taken for both polarizations of 292.7 nm light. The incident light polarization is rotated using the stressed quartz half-wave plate. The distorted line shape of the perpendicular polarization shows a barely resolved $7^2P_{1/2}$ hyperfine splitting.

Figure 24 shows transitions originating from the F = 0 ground state of $6^2P_{1/2}$ for both parallel and perpendicular polarizations. The selection rules only allow F = 0→0 when $\hat{\varepsilon} \parallel \underset{\sim}{E}$ and F = 0→1 for $\hat{\varepsilon} \perp \underset{\sim}{E}$, and the upper state hyperfine splitting becomes clearly resolved. This splitting has been measured recently by Flusberg, et al. (Flu, 76) using a two-photon doppler free spectroscopy method, and is found to be 2.13 GHz. The widths and separation of the resonance curves in Fig. 24 actually provide the best measurement of the linewidth of the doubled laser light. If we assume that the laser width is a gaussian distribution, the total line width measured is given by

$$\Delta\nu_{tot} = \sqrt{(\Delta\nu_{laser})^2 + (\Delta\nu_{doppler})^2} \qquad (1)$$

From Fig. 24, $\Delta\nu_{tot} \approx 1.2\ \Delta\nu_{hfs}(7^2P_{1/2}) = 2.56$ GHz. $\Delta\nu_{doppler} = 1.13$ GHz at 950°K. Hence,

$$\Delta\nu_{laser} = 2.3 \text{ GHz} .$$