product of the wavelength and diffraction order is known because no diffraction order information can be extracted. Preliminary analysis of the pipeline output immediately revealed a beautiful line-rich spectrum. The complete background-subtracted, negative-order spectrum between 5 and 175 Å is shown in Figure 1. Line identifications were made using previously measured and/or theoretical wavelengths from the literature. The most prominent lines are listed in Table 1.

The spectral resolution $\Delta \lambda$ of the LETGS is nearly constant when expressed in wavelength units, and therefore the resolving power $\lambda/\Delta \lambda$ is greatest at long wavelengths. With the current uncertainty of the LETGS wavelength scale of about 0.015 Å, this means that the prominent lines at 150 and 171 Å could be used to measure Doppler shifts as small as 30 km s$^{-1}$, such as may occur during stellar flare mass ejections, once the absolute wavelength calibration of the instrument has been established. This requires, however, that line rest-frame wavelengths are accurately known and that effects such as the orbital velocity of the Earth around the Sun are taken into account. Higher order lines, such as the strong O viii Ly$\alpha$ line at 18.97 Å, which is seen out to sixth order, can also be used.

3. DIAGNOSTICS

A quantitative analysis of the entire spectrum by multitemperature fitting or differential emission measure modeling yields a detailed thermal structure of the corona, but this requires accurate detector efficiency calibration which has not yet been completed. However, some diagnostics based on intensity ratios of lines lying closely together can already be applied. In this Letter we consider the helium-like line diagnostic and briefly discuss the resonance scattering in the Fe xvii $\lambda$15.014 line.

3.1. Electron Density and Temperature Diagnostics

Electron densities $n_e$ can be measured using density-sensitive spectral lines originating from metastable levels, such as the forbidden ($f$) 2$^3S$ $\rightarrow$ 1$^1S$ line in helium-like ions. This line and the associated resonance ($r$) 2$^3P$ $\rightarrow$ 1$^1S$ and intercombination ($i$) 2$^3P$ $\rightarrow$ 1$^1S$ line make up the so-called helium-like “triplet” lines (Gabriel & Jordan 1969; Pradhan 1982; Mewe, Gronenschild, & van den Oord 1985). The intensity ratio $(i + f)/r$ varies with electron temperature $T_e$, but more importantly, the ratio $i/r$ varies with $n_e$ due to the collisional coupling between the 2$^3S$ and 2$^3P$ level.

The LETGS wavelength band contains the He-like triplets from C, N, O, Ne, Mg, and Si (110, 29, 22, 13.5, 9.2, and 6.6 Å, respectively). However, the Si and Mg triplets are not sufficiently resolved and the Ne r$\lambda$ triplet is too heavily blended with iron and nickel lines for unambiguous density analysis. The O vii lines are clean (see Fig. 2), and the C v and N vi lines can be separated from the blends by simultaneous fitting of all lines. These triplets are suited to diagnose plasmas in the range $n_e = 10^8$–$10^{11}$ cm$^{-3}$ and $T_e = 1$–3 MK. For the C, N, and O triplets the measured $i/r$ ratios are 0.38 ± 0.14, 0.52 ± 0.15, and 0.250 ± 0.035, respectively, which imply (Pradhan 1982) $n_e$ (in $10^6$ cm$^{-3}$) = 2.8 ± 1.3, 6 ± 3, and $\approx$5 (1 $\sigma$ upper limit), respectively, for typical temperatures as indicated by the $(i + f)/r$ ratios of 1, 1, and 3 MK, respectively. This concerns the lower temperature part of a multitemperature structure which also contains a hot ($\sim$6–8 MK) and dense ($\approx$10$^{12}$ cm$^{-3}$) compact plasma component (see § 3.2). The derived densities are comparable to those of active regions on the Sun with a temperature of a few MK. Figure 2 shows a fit to the O vii triplet measured in the −1 order. The He-like triplet diagnostic, which was first applied to the Sun (e.g., Acton et al. 1972; Wolfson, Doyle, & Phillips 1983), has now for the first time been applied to a star other than the Sun.

The long-wavelength region of the LETGS between 90 and 150 Å contains a number of density-sensitive lines from 2$\rightarrow$2$'$$'$ transitions in the Fe-L ions Fe xx–Fe xxii, which provide density diagnostics for relatively hot ($\approx$5 MK) and dense ($\approx$10$^{13}$ cm$^{-3}$) plasmas (Mewe et al. 1985; Mewe, Lemen, & Schrijver 1991; Brickhouse, Raymond, & Smith 1995). These have been applied in a few cases to EUVE spectra of late-type stars and in the case of Capella have suggested densities more than 2 orders of magnitude higher than found here for cooler plasma (Dupree et al. 1993; Schrijver et al. 1995). These diagnostics will also be applied to the LETGS spectrum as soon as the long-wavelength efficiency calibration is established.

3.2. The 15–17 Å Region: Resonance Scattering of Fe xvii?

Transitions in Ne-like Fe xvii yield the strongest emission lines in the range 15–17 Å (see Fig. 1). In principle, the optical depth $\tau$ in the 15.014 Å line can be obtained by applying a simplified escape-factor model to the ratio of the Fe xvii $\lambda$15.014 resonance line with a large oscillator strength to a presumably optically thin Fe xvii line with a small oscillator strength. We use the 15.265 Å line because the 16.780 Å line can be affected by radiative cascades (D. A. Liedahl 1999, private communication). Solar physicists have used this tech-