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Mapping the cloudy skies of the galactic black hole Cyg $X-1^1$ NATALIE HELL, LLNL & Remeis-Sternwarte/ECAP/FAU, G.V. BROWN, LLNL, J. WILMS, I. MISKOVICOVA, M. HANKE, Remeis-Sternwarte/ECAP/FAU, J. CLEMENTSON, MPI for Plasma Physics, P. BEIERSDORFER, D. LIEDAHL, LLNL, K. POTTSCHMIDT, CRESST/UMBC & NASA/GSFC, F.S. PORTER, C.A. KILBOURNE, R.L. KELLEY, NASA/GSFC, V. GRINBERG, M.A. NOWAK, N.S. SCHULZ, MIT — The high mass X-ray binary Cyg X-1 consists of a black hole (BH) and its supermassive companion star. The system's X-ray emission is powered through accretion of the companion's strong stellar wind that is focused onto the BH. Observational evidence suggests that the wind is a two-component medium: clumps of cooler and denser material embedded in tenuous hot gas. The clumps passing through our line of sight cause strong flux reductions (dips) in the observed lightcurves. While the absorption lines of He- and H-like ions in the spectra extracted from the dip-free phases are signatures of the hot gas, the cooler clumps cause additional absorption from lower ionized Si and S. Reliable atomic data are needed to derive Doppler shifts for these spectral lines, but the predicted uncertainty for the theoretical calculations is on the order of the expected shifts. We measured the K-shell transitions in L-shell Si and S ions at the LLNL electron beam ion trap. Combining the new reference data with the spectral signature of the clumps across various orbital phases allows us to map the clump distribution around the BH.

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