High resolution EUV spectroscopy of Feige 24

M.A. Barstow[1], M. P. Kowalski[2], K.S. Wood[2], D.J. Yentis[2,3], G.G. Fritz[4], J.S. Lapington[1], T.W. Barbee, Jr.[5], and R.G. Cruddace[2]

1. Dept. of Physics and Astronomy, University of Leicester, Leicester LE1 7RH UK: mab@star.le.ac.uk, jsl12@star.le.ac.uk 2. Naval Research Laboratory, Code 7655, 4555 Overlook Ave., SW, Washington, DC 20375, USA: michael.kowalski@nrl.navy.mil, kent.wood@nrl.navy.mil, raymond.cruddace@nrl.navy.mil 3. Deceased 4. PRAXIS, Inc., 5845 Richmond Hwy, Suite 700, Alexandria, VA 22303 USA: gil.fritz@nrl.navy.mil 5. Lawrence Livermore National Laboratory, MS L-353, 7000 East Ave., P.O. Box 808, Livermore, CA 94550 USA: barbee2@llnl.gov

We report the first high-resolution (R=4000) spectroscopic observation of the binary DA white dwarf Feige 24 in the extreme-ultraviolet band 220-250 . A stellar atmosphere model assuming a homogeneous element distribution yields a best fit to the data that excludes a significant abundance of photospheric helium, a surprising result contrary to predictions by common envelope evolution theory. The upper limit on the photospheric helium abundance is 2.5x10^{-6} (90% confidence), and the lower limit on the overlying layer of hydrogen is $10^{-12.92}$ M_{solar}. An ionized He component (3.6 x 10^{17} cm^{-2}) is clearly present along the line-of-sight, which if completely interstellar implies a He ionization fraction of 0.7, considerably higher than is typical of the local interstellar medium.