Table 3. Input parameters for example physical models of 182-413

Stellar spectrum:	$T_* = 39\,000$ K
(Simón-Díaz et al. 2006)	$\log g = 4.1$
	$L_* = 2.04 \times 10^5\ L_\odot$
Ionizing flux at proplyd:	$\Phi_{\rm H} = 1.27 \times 10^{12}\ {\rm cm^{-2}\ s^{-1}}$
Ionization front radius:	$r_0 = 3.7 \times 10^{15}$ cm
Gas-phase abundances:	Model A: Esteban et al. (2004)
	Model B: this paper
Dust composition:	Standard Orion (Baldwin et al. 1991)

4 PHOTOEVAPORATION MODELS OF HST 10

We have calculated dynamic photoevaporation models of HST 10, using the procedure outlined in SS 6 of Mesa-Delgado et al. (2012). The parameters for the models are shown in Table 3. As compared with 177-341 (HST 1), which was modeled in Mesa-Delgado et al. (2012), HST 10 receives a roughly ten times smaller ionizing flux and is roughly twice as large. Since $F \propto n^2 r$ for recombination-dominated photoevaporation flows (Bertoldi & McKee 1990; Henney 2001), this implies that the densities in HST 10 should be $\simeq 5$ times smaller and the ionization parameter $\simeq 2$ times smaller than in HST 1.

Two different abundance sets were used in the models. The first (Model A) is the standard Orion gas phase abundance set, as determined by Esteban et al. (2004). The second (Model B) is the set of abundances determined in this paper by empirical means, see Table 3. The resultant spectrum is shown in Figure 8 for the two cases. It can be seen that the Esteban et al. abundances produce very large discrepancies between the observed and predicted line fluxes (panel a). In particular, all Sulfur, Argon and Chlorine lines are too strong in the model by a factor of 3 to 10, whereas, [O III] 4363 Å is too weak, indicating that the model temperature is too low in the highly ionized regions. On the other hand, the [N II] lines are well-reproduced y this model.

The situation is much improved by using the Model B abundances (panel b), although serious discrepancies remain. The sulfur line fluxes are now in good agreement with the observations, with the notable exception of the [S II] 4070 Å auroral line, which is still 3 times too strong in the model. The [O I] 6300 Å shows a similar behaviour, being too strong by a factor of 4. These two lines, together with the [N II] 5755 Å auroral line, show the strongest contrast between the proplyd and the background nebula, and hence are measured with a relatively small uncertainty, making the disagreement highly significant.

REFERENCES

Baldwin J. A., Ferland G. J., Martin P. G., Corbin M. R., Cota S. A., Peterson B. M., Slettebak A., 1991, ApJ, 374, 580
Bertoldi F., McKee C. F., 1990, ApJ, 354, 529
Esteban C., Peimbert M., García-Rojas J., Ruiz M. T., Peimbert A., Rodríguez M., 2004, MNRAS, 355, 229
Henney W. J., 2001, in Revista Mexicana de Astronomia y Astrofisica Conference Series, Vol. 10, Revista Mexicana de Astronomia y Astrofisica Conference Series, Cantó J., Rodríguez L. F., eds., pp. 57–60
Mesa-Delgado A., Núñez-Díaz M., Esteban C., García-Rojas J., Flores-Fajardo N., López-Martín L., Tsamis Y. G., Henney W. J., 2012, ArXiv e-prints
Simón-Díaz S., Herrero A., Esteban C., Najarro F., 2006, A&A, 448, 351

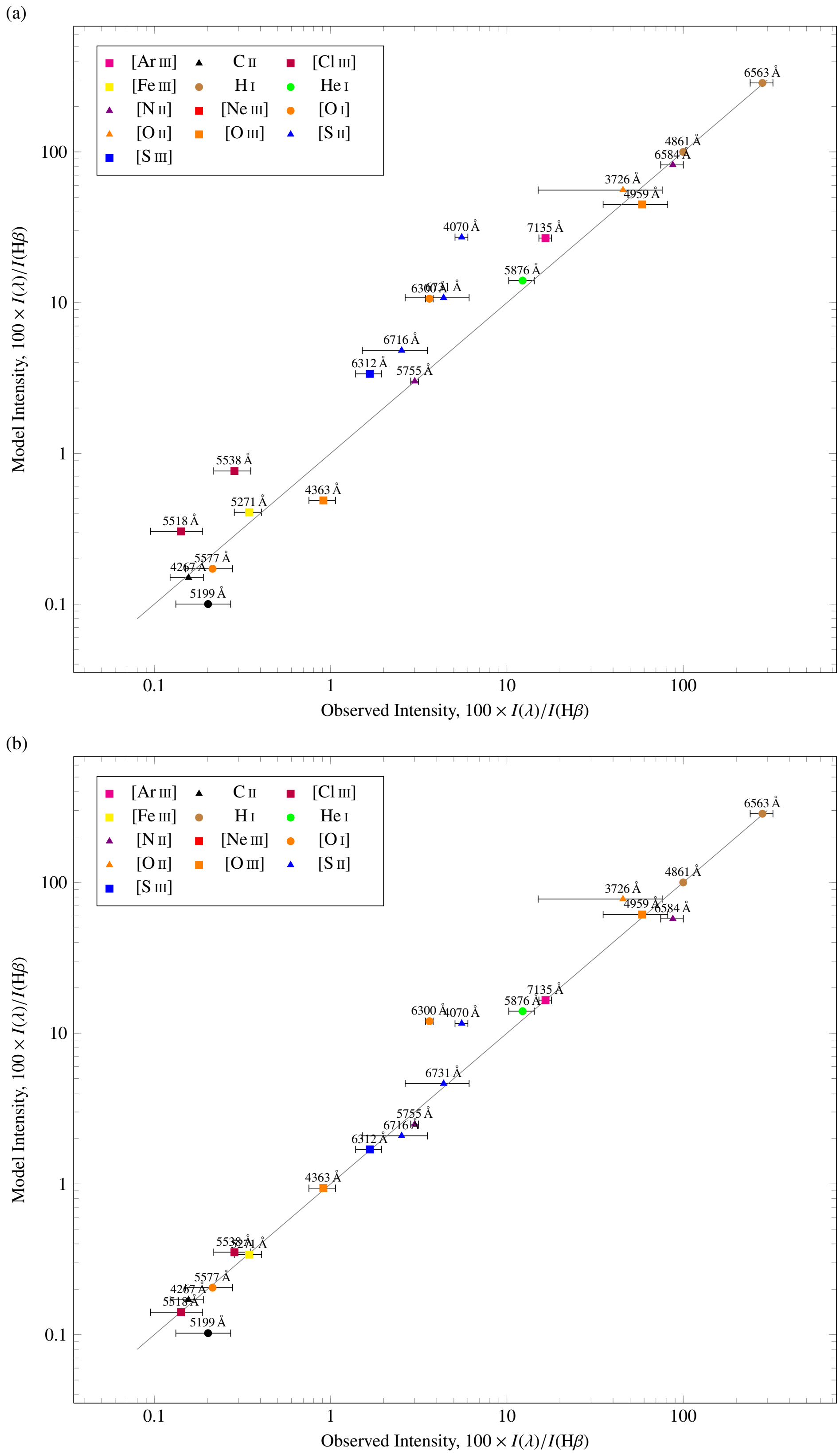

Figure 8. Comparison between predicted and observed emission line fluxes for photoevaporation models of HST 10 with (a) abundances as determined for the Orion Nebula by Esteban et al. (2004), (b) abundances determined for HST 10 in this paper. The agreement in panel (b) is much better, but there are still notable discrepancies.