EoS Figures: Ionization and Recombination – slices during first 50 days

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ABSTRACT Figures

Key words: binaries: close – stars: evolution – stars: kinematics and dynamics – stars: mass loss – stars: winds, outflows – hydrodynamics

1 RESULTS

• A lot of helium recombination takes place, both HeIII \rightarrow HeII and HeII \rightarrow HeI, starting .

– Some of this recombination takes place in already unbound gas

- Some of this recombination takes place in bound gas that would have been unbound anyway (without recombination energy)

• However, there is also quite a lot of ionization HeII \rightarrow HeIII and HeI \rightarrow HeII near the particles.

• Some of this ionization happens in gas that is bound (perhaps preventing the gas from becoming unbound?)

• This ionization happens almost immediately from $t \sim 0 d$ (around the secondary) whereas recombination happens a bit later (visible from frame 10 or $t \sim 2 d$, near secondary)

• Hydrogen recombination HII \rightarrow HI happens much later (after $t \sim 30 \text{ d}$), far from the particles in regions of low density.

• This hydrogen recombination happens partly in already unbound gas and partly in bound gas.

• No molecular hydrogen is formed by the end of the simulation

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Figure 1. Left: Normalized unbound gas (based on usual criterion of our past papers, not including latent recombination energy Middleo (0.900) 100 gao (0.900) a given original Helium ionization state. Right: Density of gas with a given Helium ionization state at time *t*. Snapshots are taken every 25 frames or 5.8 d.



Figure 2. Continuation of Fig. 1.



Figure 3. As Fig. 1 but now zoomed in.

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Figure 4. Continuation of Fig. 5.



Figure 5. As Fig. 5 but now showing higher frequency (every 5 frames instead of 25 from frame 0-25)NRAS 000, 000-000 (0000)



Figure 6. As Fig. 1 but now edge-on, sliced through the particles.



Figure 7. Continuation of Fig. 6.





Figure 9. Continuation of Fig. 8.



Figure 10. Same as Fig. 1 but now for hydrogen.



Figure 11. Continuation of Fig. 10.



Figure 12. As Fig. 10 but now zoomed in.



Figure 13. Continuation of Fig. 12.



Figure 14. As Fig. 10 but now edge-on, sliced through the particles.



Figure 15. Continuation of Fig. 14.

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Figure 16. As Fig. 14 but now zoomed in.



Figure 17. Continuation of Fig. 16.