Q10a Constraining physical conditions for the PDR of Trumpler 14 in Carina Nebula

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At a close distance, 2.3 kpc, from us in the Milky Way, Carina Nebula is the largest and brightest nebula in the southern sky. It hosts a majority of the most massive stars known in our Galaxy and thus provides an ideal laboratory for studying on-going star formation. Interpreted with the state-of-the-art *Meudon PDR* code, we present the physical conditions of the emission of CO-ladders, observed by *Herschel* SPIRE/FTS, across an HII–PDR interface located at the northwest in the Carina Nebula. The ionization front of this region sits at a projected distance of $\sim$ 2 pc from the young ($1-2$ Myr) OB-star cluster, Trumpler 14 (Tr 14), which provides its dominant UV input. From this work, we conclude that:

1. Confirmed by the nearby stellar compositions, the *Meudon PDR* code successfully solves the physical conditions of the observed CO clouds. We find that the pressure (P) and radiation fields (G_{UV}) are generally around $\gtrsim 10^8$ K cm^{-3} and $\gtrsim 10^4$ (Mathis unit) for the mid-J ($J = 4-3$ to $J = 13-12$) transition-emitting CO clouds in this region.
2. Although further spatially-resolved evidence is needed to unambiguously conclude the geometry of the clouds, our results favor the scenario that the CO emission originates from the high-pressure ridge at the molecular cloud surface, rather than from the clumpy pockets embedded in the diffuse ISM.