

HI-to-H2 Transitions in Galaxy Star-Forming Regions

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I will describe new analytic theory for the atomic to molecular (HI-to-H2) transitions, and the build-up of atomic-hydrogen (HI) gas columns in star-forming clouds, based on fundamental physics principles. I will discuss my general-purpose formula for the total HI columns produced by photodissociation in optically thick media, valid for beamed or isotropic radiation fields, the weak- to strong-field limits, gradual to sharp HI-to-H2 transitions, and for arbitrary metallicity. The analytic theory is validated with detailed numerical radiative transfer computations. The general theory may be broadly used for interpreting 21 cm studies of individual Galactic sources and global galaxy properties, and may also be incorporated into hydrodynamics simulations.

References

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