
Do Roche lobes effect the compliment of circumstellar masers about O-rich AGB stars?

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Abstract

Past consideration of the masers exhibited by O-rich AGB stars assumes a solitary star. Yet many are binaries, with winds crafted by Roche lobes. This greatly expands the parameter space and range of conditions that can affect the production of masers. Thus OH masers may be collisionally suppressed in a Roche lobe even while water masers are supported. Or the mass distribution may be flattened, with consequent changes to the penetration of interstellar UV into the shell, and changes to the location and conditions affecting the photo-disruption of molecules. This review will look at results from two 1612 MHz and OH mainline surveys using Arecibo, in conjunction with 22 GHz water observations from Effelsberg. A particularly noteworthy finding is that the majority of $\sim 10^6$ IRAS sources in the Arecibo sky without detectable 1612 MHz masers exhibit strong differences in the presence of circumstellar masers from those found in OH/IR stars, as well as a different location on an H - K v (25-12) μm MIR color plot. About half are recognized SR stars; presumptively all are. This suggests that SR stars are binaries where the outflowing wind is entrained into a Roche lobe.

Keywords: Roche lobes, 22 GHz masers, OH masers, SR stars

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