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THE SPIDER STELLAR ENGINE: A SHOCKING EXTRATERRESTRIAL DESIGN?

Abstract

An advanced civilization is likely to use the energy of its home star to control its motion in the galaxy. The motivations include avoiding supernovas, engaging in interstellar life spreading, or migrating towards a nearby star as its home star fades away. For these reasons, the search for non-communicative technosignatures includes the search for stellar engines. On the observational side, hypervelocity stars have been the target of such searches, but have not led to promising candidates [1]. On the theoretical side, stellar engine concepts have been proposed [2–4] but they have not been linked to observable technosignatures. We propose to interpret the complex phenomenology of spider pulsars as a stellar engine. To do so, we confront the fundamental constraints and results of stellar engine concepts with current models of spider binaries. A spider pulsar irradiates its companion star with highly relativistic winds, leading to mass-loss. If this mass-loss is then somehow channeled toward one direction or another outside the system, this creates a thrust, as the fundamental physics of thrust is to expel matter. More precisely, we argue that the *intrabinary shock* geometry [5–8] might play a crucial role for channeling mass-loss, and thus for controlling thrust and direction. Building on the stellivore hypothesis [9-10], looking for evidence of spider pulsar engines constitutes a unique and previously unexplored type of potential technosignature.

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