

Giants Orbiting Giants: A Search for Transiting Planets around Oscillating Red-Giant Branch Stars with K2

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While exoplanet transit surveys are increasingly focused on cool dwarfs, transiting planets orbiting red-giant branch (RGB) stars are largely unexplored. Due to their diversity in fundamental properties (masses, luminosities, chemical compositions), RGB stars are ideal targets to tackle two key unsolved questions in exoplanet science: the occurrence rate of gas-giant planets as a function of host star mass, and the role of stellar incident flux on the radius inflation of gas-giant planets. We propose a survey of 1648 low-luminosity RGB stars (with radii between ~ 3.5 -8 solar radii) using long-cadence data to detect transiting gas-giant planets with K2. Since RGB stars oscillate with periods accessible with K2 long-cadence data, we will use asteroseismology to precisely characterize both the host stars and the detected planet candidates. Follow-up ground-based radial velocity observations will be used to confirm the planet candidates. The proposal addresses two main K2 science goals: exoplanet detection and stellar astrophysics. This project is the only possibility to realize a K2 survey which systematically combines asteroseismology and transits to precisely characterize exoplanets.