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***Breakthrough Listen* at UC Berkeley to conduct follow up observations of reported anomalous spectral features in solar type stars.**

A recent paper entitled "[Discovery of peculiar periodic spectral modulations in a small fraction of solar type stars](#)" by Borra and Trottier (2016), Université Laval, Quebec, reports the detection of periodic spectral modulations in 234 out of 2.5 million stars observed by the Sloan Digital Sky Survey (SDSS). Authors Borra and Trottier state that the signal is consistent with a prediction from an [earlier paper](#) by Borra, for signals from extraterrestrial civilizations broadcasting extremely rapid (shorter than 0.1 nanoseconds) optical pulses superimposed on the light of the host stars.

The one in 10,000 objects with unusual spectra seen by Borra and Trottier are certainly worthy of additional study. However, extraordinary claims require extraordinary evidence. It is too early to unequivocally attribute these purported signals to the activities of extraterrestrial civilizations. Internationally agreed-upon protocols for searches for evidence of advanced life beyond Earth (SETI) require candidates to be confirmed by independent groups using their own telescopes, and for all natural explanations to be exhausted before invoking extraterrestrial agents as an explanation. Careful work must be undertaken to determine false positive rates, to rule out natural and instrumental explanations, and most importantly, to confirm detections using two or more independent telescopes.

Peaks in Fourier analysis of stellar spectra, such as those discussed by Borra and Trottier, can be caused by instrumental optics or introduced during data reduction. Data artifacts, fringing, and inconsistencies in the manufacture of detectors are known to users of high resolution spectrographs to cause minute patterns to appear in the resulting spectra. The movement of the telescope, variations in observing conditions, and the process of wavelength calibration can easily introduce undesired signals at levels that are only barely detectable. It is therefore important to check the claimed signal using a different telescope and instrument.

The [Berkeley SETI Research Center](#) (BSRC) team has added several stars from the Borra and Trottier sample to the [Breakthrough Listen](#) observing queue on the 2.4-meter [Automated Planet Finder](#) (APF) optical telescope. The capabilities of the APF spectrograph are well matched to those of the original detection, and these independent follow-up observations will enable us to verify or refute the reported detections. We look forward to consulting with Professor Borra and his team on these observations, as well as additional follow up investigations using other data sources.

The international SETI community has established a 0 to 10 scale for quantifying detections of phenomena that may indicate the existence of advanced life beyond the Earth called the "[Rio Scale](#)." The BSRC team assesses the Borra-Trottier result to currently be a 0 or 1 (None/Insignificant) on this scale. If the signal were to be confirmed with another independent telescope, its significance would rise, though an exhaustive analysis of other possible explanations, including instrumental phenomena, must be performed before supporting the hypothesis that artificially generated pulses are responsible for the claimed signal.

The Search for Extra-Terrestrial Intelligence (SETI) is a field of science that attempts to find signatures of technology developed by civilizations other than our own. No such signals have yet been found, but large surveys hold the best promise of expanding the search space sufficiently for a detection to occur.

Breakthrough Listen, whose science program is headquartered at [Berkeley SETI Research Center](#) at the University of California, Berkeley's Astronomy Department, is undertaking such a search. Breakthrough Listen includes efforts using the *Robert C. Byrd Green Bank Telescope* (GBT) and *Parkes Observatory* to

scan for artificial radio signals, as well as a program with the *Automated Planet Finder (APF)* at Lick Observatory searching for emission from extraterrestrial laser technology.

Breakthrough Listen is foremost a scientific program seeking to answer questions surrounding the past or presence of advanced life in the universe. To such end, *Breakthrough Listen* seeks collaboration with academic institutions, respective SETI groups and telescopes across the world. *Breakthrough Listen* belongs to a portfolio of other *Breakthrough Initiatives*, designed to stimulate scientific discourse in pursuit of humanity's grandest question; "Are we alone?".

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The Automated Planet Finder at Lick Observatory (Credit: Vogt et al 2014)