A Fourier transform analysis of 2.5 million spectra in the Sloan Digital Sky Survey was carried out to detect periodic spectral modulations. Signals having the same period were found in only 234 stars overwhelmingly in the F2 to K1 spectral range. The signals cannot be caused by instrumental or data analysis effects because they are present in only a very small fraction of stars within a narrow spectral range and because signal to noise ratio considerations predict that the signal should mostly be detected in the brightest objects, while this is not the case. We consider several possibilities, such as rotational transitions in molecules, rapid pulsations, Fourier transform of spectral lines and signals generated by Extraterrestrial Intelligence (ETI). They cannot be generated by molecules or rapid pulsations. It is highly unlikely that they come from the Fourier transform of spectral lines because too many strong lines located at nearly periodic frequencies are needed. Finally we consider the possibility, predicted in a previous published paper, that the signals are caused by light pulses generated by Extraterrestrial Intelligence to makes us aware of their existence. We find that the detected signals have exactly the shape of an ETI signal predicted in the previous publication and are therefore in agreement with this hypothesis. The fact that they are only found in a very small fraction of stars within a narrow spectral range centered near the spectral type of the sun is also in agreement with the ETI hypothesis. However, at this stage, this hypothesis needs to be confirmed with further work. Although unlikely, there is also a possibility that the signals are due to highly peculiar chemical compositions in a small fraction of galactic halo stars.

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Québec (Canada) – Canadian astrophysicists have discovered 234 cases of what they call „peculiar periodic spectral modulations in a small fraction of solar type stars“, which translates as variations in the light-pattern of 234 stars more or less similar to our own sun. Even after examining a wide range of possible technical and astrophysical  explanations the scientists are left with the hypothesis – even if still speculative in nature – that the signals are caused by light pulses generated by Extraterrestrial Intelligence (ETI) to makes us aware of their existence.

As [Prof. Ermanno F. Borra](http://www.copl.ulaval.ca/no_cache/membres/fiche_du_membre/professeur/13/36) and Eric Trottier of the Université Laval in Québec report in a preprint-paper via „[ArXiv.org](https://arxiv.org/abs/1610.03031)„, their new discoveries match exactly with a modulated signal that Prof. Borra described and simulated already in [a paper published in 2012](https://arxiv.org/abs/1210.5986), in which he described how intelligent signals could be hidden but also discovered in already available data-sets of sky surveys.

As Prof. Borra explains to „Grenzwissenschaft-Aktuell.de“ (GreWi): „The paper discusses the results of an analysis of 2.5 million spectra of astronomical objects. A spectrum gives, in great details, the measurement of the intensity of light as a function of color.

this work was carried out to detect periodic signals in their spectra generated by Extraterrestrial Intelligence (ETI). The periodic signal predicted in a previous scientific publication was found in only 234 stars that are overwhelmingly similar to the sun (but neither in galaxies nor quasars).

A detailed statistical analysis in the paper definitely shows that the signals cannot be caused by instrumental or data analysis effects. Several other possible physical causes of the signals are also considered but quantitative analyses show that they cannot generate the signals.

Because the detected signals have exactly the shape of an ETI signal predicted in a scientific publication (2012) they are therefore in agreement with the ETI hypothesis. The ETI hypothesis is strengthened by the fact that the signals were detected in only a small fraction of stars that have spectral types (colors) in a narrow spectral range centered on the spectral type of the sun. On the other hand, the ETI hypothesis is so peculiar that, at this stage, it cannot be accepted as certain. It absolutely has to be confirmed, or denied, by more observations.“

*Fourier modulus of the frequency spectrum (after subtraction of its smoothed spectrum) of an F5 star that has a statistically significant signal (see enlargement).*  
*Copyright/Source: [Borra u. Trottier, 2016](https://arxiv.org/abs/1610.03031" \t "_blank)*

According to the authors, so far the only other explanation, alternatively to the ETI-hypothesis is the idea „that the signals are due to highly peculiar chemical compositions in a small fraction of galactic halo stars“.

Beside the fact that Borra and Trottier could not find a technical or astrophysical explanation for the discovered signals, the signals also match exactly with the one suggested and simulated by Borra already in 2012 when he suggested to look for exactly that kind of signals hidden in already available data of large sky surveys like the Sloan Digital Sky Survey (SDSS).

*In 2012 Prof. Borra simulated an initially invisibly modulated spectrum of a star (l.) in which an embedded signal becomes recognizable after a fourir transform analysis (r.).*  
*Copyright/Source: [Ermanno F. Borra, 2012](https://arxiv.org/abs/1210.5986" \t "_blank)*

Such strong light signals could be send for example with powerful lasers, that get modulated in such a way that they get embedded in the light spectrum of a star as a pattern that could very well be discovered and recognized as such by an intelligent observer.

[HERE](http://www.grenzwissenschaft-aktuell.de/grewi-newsletter-bestellen/) you can order the free [GreWi-Newsletter](http://www.grenzwissenschaft-aktuell.de/grewi-newsletter-bestellen/" \t "_blank) (…in German language)

„The fact that only a small fraction of stars, in a narrow spectral range centered near the spectral type of the sun, has the signal in agreement with the ETI hypothesis since we intuitively would expect that solar type stars would have ETI and only a small fraction of them would have ETI“, the authors explain in their paper and continue:

„The ETI hypothesis requires that all different ETI transmitters choose to broadcast with the same time separation of pulses and one may wonder why they do so. This is a highly speculative issue that may have several explanations. A possible explanation that makes sense is that all ETI use the same time separation to make it clear that the pulses all come from ETI.“

Concluding their paper, Borra and Trottier emphasize that at this stage, the ETI generation of the spectral modulation is still a hypothesis that needs to be confirmed with further work.

They suggest that this can be done by repeatedly observing the described stars with photoelectric detectors capable of detecting very rapid intensity signals: „However ETI may not necessarily send us pulses at all times so that a lack of detections in some stars may not necessarily signify that ETI does not exist: The reason

why ETI may not send pulses at all times may simply come from the fact that the signals must be sent to a very large number of stars so that too much energy would be required to send pulses to all stars at all times.“

According to Borra he now has already contacted SETI-astronomers who seemed very interested to do a follow-up. „Now I am waiting for the other astronomers actions and help them.“

Uno studio scientifico che farà discutere, forse quanto quello sulla ormai famosa Tabby’s Star- la stella aliena per antonomasia, ormai, anche per i non addetti ai lavori. Questa volta a parlare di astri dal comportamento così anomalo da far pensare alla presenza di intelligenze extraterrestri è un articolo pubblicato online su ArXiv.org della Cornell University.

Il riferimento alle Intelligenze Extraterrestri- ETI, nella sigla anglosassone- non è nostro, ma è esplicitamente indicato nell’abstract della ricerca, i cui autori sono due astrofisici dell’università canadese di Lavàl, in Quebec: l’italiano Ermanno Borra e il collega Eric Trottier. Anzi, per i due studiosi, al momento si tratta dell’ipotesi addirittura più probabile per spiegare il fenomeno che hanno registrato.

Analizzando 2 milioni e mezzo di spettri dello Sloan Digital Sky Survey (il progetto che ha realizzato una accurata cartografia digitale del cielo) hanno evidenziato delle particolari modulazione spettrali periodiche (potremmo dire banalmente, variazioni della luminosità) solo in una piccolissima quantità di stelle molto simili al nostro Sole, per l’esattezza in 234 casi. Avendo subito escluso errori nelle strumentazioni e nei dati, hanno preso in esame le possibili spiegazioni tecniche, escludendole una dopo l’altra.

“Alla fine, abbiamo considerato la possibilità - predetta in un precedente studio pubblicato- che i segnali fossero causati da pulsazioni luminose generate da Intelligenze Extraterrestri per renderci consapevoli della loro esistenza. Riteniamo che i segnali individuati abbiano esattamente la forma di un segnale ETI previsto nella precedente pubblicazione e sono coerenti con questa ipotesi. Il fatto che siano state trovate solo in una piccolissima frazione di stelle con un ristretto intervallo spettrale vicino a quello del Sole è pure coerente con l’ipotesi ETI. Tuttavia, al momento, l’ipotesi necessita di essere confermata da ulteriori studi.”

\*\*\* A Fourier transform analysis of 2.5 million spectra in the Sloan Digital Sky Survey was carried out to detect periodic spectral modulations. Signals having the same period were found in only 234 stars overwhelmingly in the F2 to K1 spectral range. The signals cannot be caused by instrumental or data analysis effects because they are present in only a very small fraction of stars within a narrow spectral range and because signal to noise ratio considerations predict that the signal should mostly be detected in the brightest objects, while this is not the case. We consider several possibilities, such as rotational transitions in molecules, rapid pulsations, Fourier transform of spectral lines and signals generated by Extraterrestrial Intelligence (ETI). They cannot be generated by molecules or rapid pulsations. It is highly unlikely that they come from the Fourier transform of spectral lines because too many strong lines located at nearly periodic frequencies are needed. Finally we consider the possibility, predicted in a previous published paper, that the signals are caused by light pulses generated by Extraterrestrial Intelligence to makes us aware of their existence. We find that the detected signals have exactly the shape of an ETI signal predicted in the previous publication and are therefore in agreement with this hypothesis. The fact that they are only found in a very small fraction of stars within a narrow spectral range centered near the spectral type of the sun is also in agreement with the ETI hypothesis. However, at this stage, this hypothesis needs to be confirmed with further work. Although unlikely, there is also a possibility that the signals are due to highly peculiar chemical compositions in a small fraction of galactic halo stars.

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