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Pseudoscientific ideas about "biological transmutation" give false hope that the transformation of Cs-137 and Sr-90 into stable elements can be carried out by living organisms.

The use of lasers to supposedly create new elements has led to the creation of pseudoscientific laboratories, which are spending considerable funds in conditions of economic hardship.

Adherence to scientific integrity is necessary not only for the development of science, but is also one of the conditions for economic stability.

Probing the sunspot magnetic field using direct spectro-polarimetric measurements in the lines of various chemical elements

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The most reliable data on magnetic fields in sunspots are obtained based on the study of the Zeeman effect in the lines of neutral iron Fe I with large Lande factors, within 2.5 - 3.0. Since sunspots are very heterogeneous formations, with an extremely fine (spatially indistinguishable) structure of the magnetic field and the distribution of thermodynamic parameters, it is of considerable interest to compare the measured magnetic fields in the lines of other chemical elements, in particular the lines of titanium and calcium. These lines are significantly enhanced in sunspots and more closely reflect the physical conditions in the coldest areas of sunspots, where particularly strong magnetic fields can exist. That is why the purpose of this work is to study the magnetic fields in the sunspot by the spectral lines of titanium, calcium and iron.

The spectral-polarization method of measuring magnetic fields was used to process observations made on the Echelle spectrograph of the horizontal solar telescope of the Astronomical Observatory of the Taras Shevchenko National University of Kyiv. The Zeeman spectrogram of the sunspot on July 17, 2023 was scanned using an Epson Perfection V 550 scanner and digitized taking into account the nonlinearity of the characteristic curves of both the photographic material and the scanner itself. Estimates of the

longitudinal and local magnetic fields in the studied spot were obtained based on the study of the splitting of the bisectors of the I ± V profiles of the Ti I 6554.238 and 6556.066 Å, Fe I 6569.224 Å and Ca I 6572.795 Å lines.

Since the above spectral lines have incomplete spectral splitting due to low Lande factors (from 1.08 to 1.5), estimates of only the longitudinal component of the magnetic field BLOS, and not the intensity modulus, were obtained from direct measurements. This parameter in some places of the spot significantly differs by the lines of different elements and has the highest values (up to 2400 G) by the Ti I 6556.066 Å line. The data for both titanium "shadow" lines correlate well with each other, but the Ti I 6556.066 Å line shows significantly higher fields everywhere than the other titanium line. It is interesting to note that the other "shadow" line, namely Ca I 6572.795 Å, shows the lowest measured fields, up to 1700 G. In the latter line, the bisectors of the I ± V profiles have a maximum splitting at a distance of about 0.32 Å from its center, which may indicate particularly strong local fields with an intensity of about 10.5 kG.

Comparison of direct measurements of the magnetic field with the calculated depths of the formation of spectral lines in the sunspot showed that the altitudinal gradient of the magnetic field reached quite large values, about 10 G/km, in absolute value. It was also found that in the altitude range from -369.8 to -291.4 km the altitudinal gradient of the magnetic field changed its sign. Such a case, as far as the authors know, has never been observed in spots. It is possible, however, that in this case not only the height of the formation of the lines plays a role, but also their different temperature sensitivity to changes in thermodynamic conditions at different depths in the spot.

Spectral manifestations of local magnetic field amplification at the chromospheric level of a solar flare

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Current estimates of local magnetic fields in solar flares vary greatly and are in the range of 10^2–10^5 G. This is partly due to the fact that solar flares are actually very different in their physical characteristics, but also to the fact