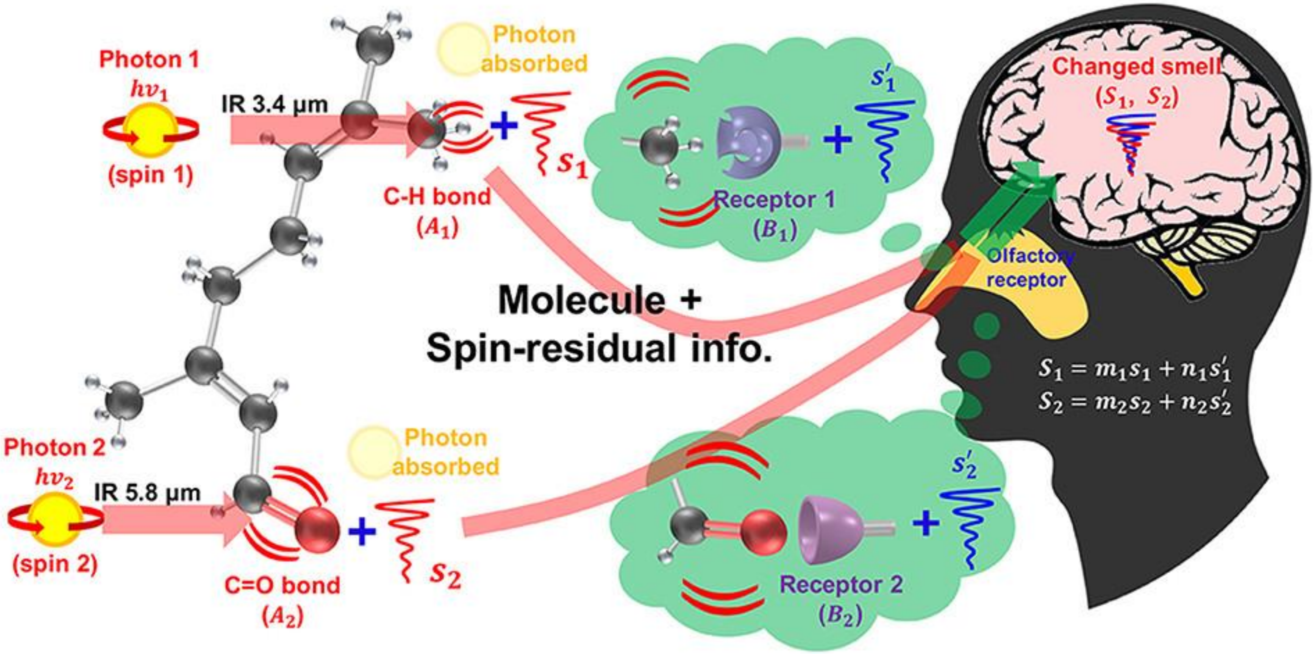

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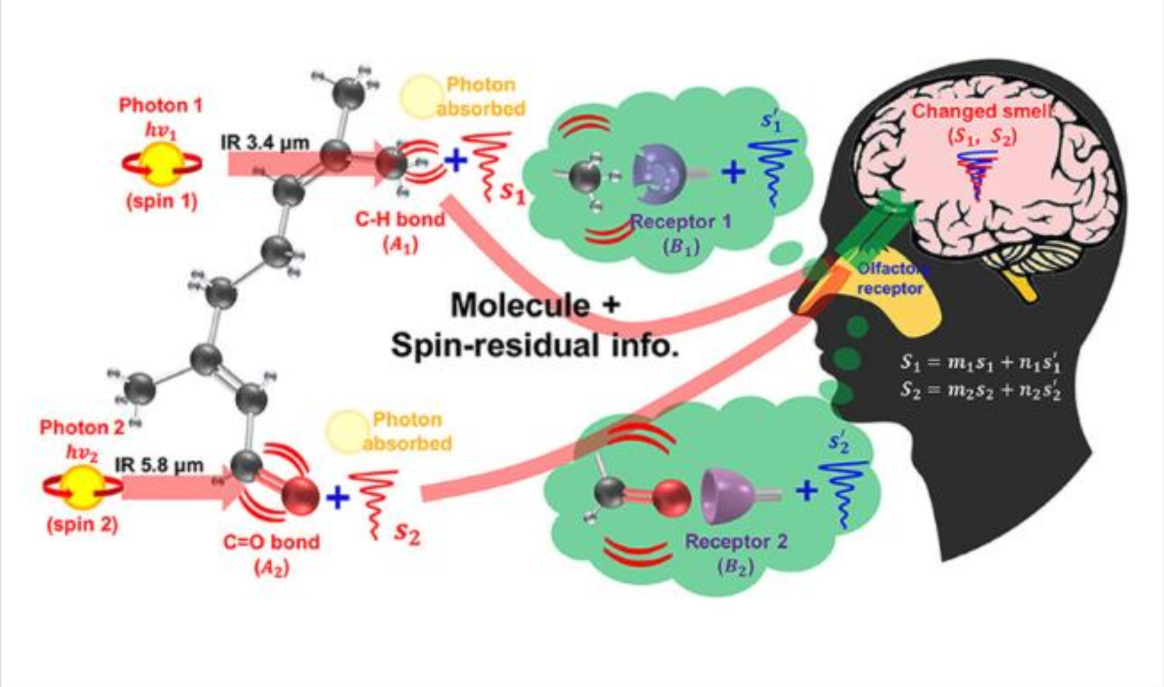
Human smell perception is governed by quantum spin-residual information

Anashe Bandari

A new method of testing human smell shows molecular bonding vibrations in an odor molecule affect the perceived olfactory intensity.



One of the two main olfactory theories is the bond vibration-assisted olfactory theory, which argues human smell perception is not influenced by the shape of the odor molecule but by oscillations in which electrons will quantum tunnel across energy gaps in the olfactory receptors. A study tests this theory by quantifying differences in the perception of the smell of excited molecules.

The researchers used infrared light to excite the molecular bond oscillation in odor molecules. As the molecules absorb the light, they begin to oscillate and emit an infrared photon, which contains spin-residual information.

To test the differences in olfactory perception of molecules at different levels of excitation, 23 human subjects were given two different scents to smell, one citrusy and the other musky. Each smell was illuminated under three different conditions: two different infrared wavelengths and a non-infrared light outside of the visible spectrum for control.

The subjects were asked to smell each scenario 10 times and rate the intensity of their smell perception for each inhale with an integer value. The first five whiffs of each test had no illumination, and the second five had one of the three illumination conditions. Each subject's fifth inhale intensity was normalized to an intensity value of 10, and the non-infrared data was subtracted from the excited data to correct for psychological effects.

The researchers found in all scenarios that the intensity of the smell was affected by external infrared illumination. To them, this means molecular bonding vibrations and spin residuals play a role in smell perception.

Due to the interdependence between taste and smell, the researchers are now working on applying their discovery to test changes in taste perception under infrared conditions.

Source: "Investigation of bond oscillation assisted olfactory perception by exciting the molecular chemical bonds using specific IR wavelengths," by Wei-Lun Huang, Ming-Ru Tang, Chung-Hung Hong, and Si-Chen Lee, *AIP Advances* (2019). The article can be accessed at https://doi.org/10.1063/1.5084270.