Molecules of light pulses

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Corrected [contrubuted by Prof. Dr. Fedor Mitschke]: Researchers at the University of Rostock in Germany have made the world's first molecules of light pulses, which might allow a significant increase in the data transfer rate of fiber optical systems. The molecules are built of temporal solitons, pulses of light that do not dissipate or easily lose their shape like most other types of pulses. Solitons are useful for transmitting information because the signals can travel over long distances without degrading.

Solitons are waves that can have characteristics similar to material particles, like electrons and billiard balls. Although molecules made from spatial solitons have been demonstrated before, the researchers claim that this is the first time anyone has made temporal solitons stick together to form structures analogous to molecules.

Fiber optical systems transmit information by sending light signals through a fiber as a combination of zeros (dark) and ones (light). The data transfer rate for binary coding is fast approaching its fundamental limits, but it may be possible to bypass the limit by transmitting information as zeros, ones, and twos with soliton molecules representing the number two.

The Rostock scientists propose that using soliton molecules as the "two" in information coding could take telecommunications technology to the next level without expensive infrastructure upgrades. They also believe that it may eventually be possible to represent higher numbers with molecules comprised of more complex groups of solitons.

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link.aps.org/abstract/PRL/v95/e143902

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https://phys.org/news/2005-10-molecules-pulses.html