

Meaning from chaos

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Transmitting light-based signals by embedding them in chaos doesn't sound like a particularly good idea. But in last week's issue of *Nature*, Claudio Mirasso and co-workers show otherwise. They have demonstrated that it is possible to send such a signal over a distance of 120 km using a commercial fibre-optic telecommunication network in the metropolitan area of Athens, Greece.

There are several benefits of sending information encoded in chaotic signals. For one thing, the chaos serves as a good encryption system: at face value, the signal looks like pure noise, and it's only when the receiver generates its own chaotic output signal, which can be synchronized with that of the transmitter, that the chaos can be removed to recover the true signal. But also, chaotic 'carrier' signals are broadband signals — they have a wide range of frequencies — which makes them more robust in the face of interference.

The basic idea is that a chaotic light signal is generated by a transmitting laser, and the receiver contains a second laser that can be induced by a feedback circuit to produce a chaotic output synchronized with that of the transmitter. The information-laden optical signal is mixed in with the chaotic signal in the transmitter, but can be decoded by subtracting the synchronized chaos of the receiver.

This process had been demonstrated previously over very short distances in the laboratory, but Mirasso and colleagues have now proved that it will work in the real world. A related News & Views article by Rajarshi Roy accompanies this research.

Source: Nature

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