

Supercontinuum generation and soliton dynamics milestone achieved

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A research team led by Fetah Benabid, University of Bath, has observed for the first time the simultaneous emission of two resonant dispersive waves by optical solitons (waves that maintain their shape while traveling at constant speeds). By designing a special fiber with an extremely small waveguiding feature located in the photonic crystal fiber cladding, the researchers were able to bring the theoretical prediction into the experimental demonstration, creating waves on both sides of the pump. This research appears in the current issue of the Optical Society's *Optics Letters*.

Since the 1980s, dispersive waves have been studied in the concept of solitons. The waves result due to perturbations that cause the soliton to lose some energy. Now, because of the flexibility in the design of Benabid's fiber, the waves are more general than they have been in the past. These "general" waves allow for a further degree of control over supercontinuum generation and have enabled a new way of generating coherent supercontinuum spectra, which is useful in a number of applications such as frequency combs. In addition, this new milestone introduces the opportunity for very compact femtosecond lasers.

For the first time, two resonant dispersive waves have been observed on both sides of the pump, providing an experimental corroboration to what previously only had been theoretical.

The unique design of the fiber itself – a nanometric-sized, rectangularshaped waveguiding feature located in the photonic crystal fiber cladding – makes these waves more general than they have been in past



experiments.

The tight confinement along with the particular dispersion properties allow supercontinuum to be generated very efficiently and over very short length, creating the potential for very compact femtosecond lasers.

Citation: "Fourth-order dispersion mediated solitonic radiations in HC-PCF cladding," Optics Letters, Vol. 33, Issue 22, pp. 2680.

Source: Optical Society of America

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