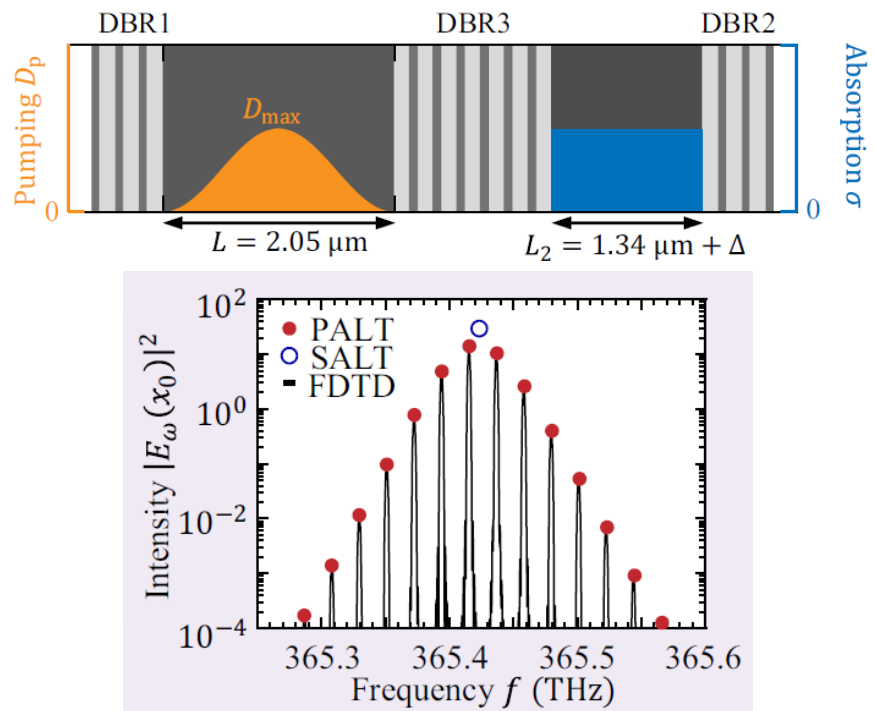


An Exceptional Approach to Generating Frequency Combs



Schematic of a simple optical system that exhibits an exceptional point (top) and the frequency comb that will develop when the system lases with sufficient intensity (bottom).

Scientific Achievement

An *ab initio* laser theory was developed to show that exceptional-point lasers can self-generate frequency combs through dynamic population inversion.

Significance and Impact

The repetition rate of these EP combs is independent of the cavity's free spectral range, with technological implications for information transport.

Research Details

- Developed a stability analysis to efficiently understand the threshold for the appearance of a frequency comb near an exceptional point.
- Confirmed results using standard simulation techniques.

Gao, X.; He, H.; Sobolewski, S.; Cerjan, A.; Hsu, C. W. Dynamic Gain and Frequency Comb Formation in Exceptional-Point Lasers. *Nature Communications* 2024, 15 (1). DOI:10.1038/s41467-024-52957-4.

Work was performed, in part, at the Center for Integrated