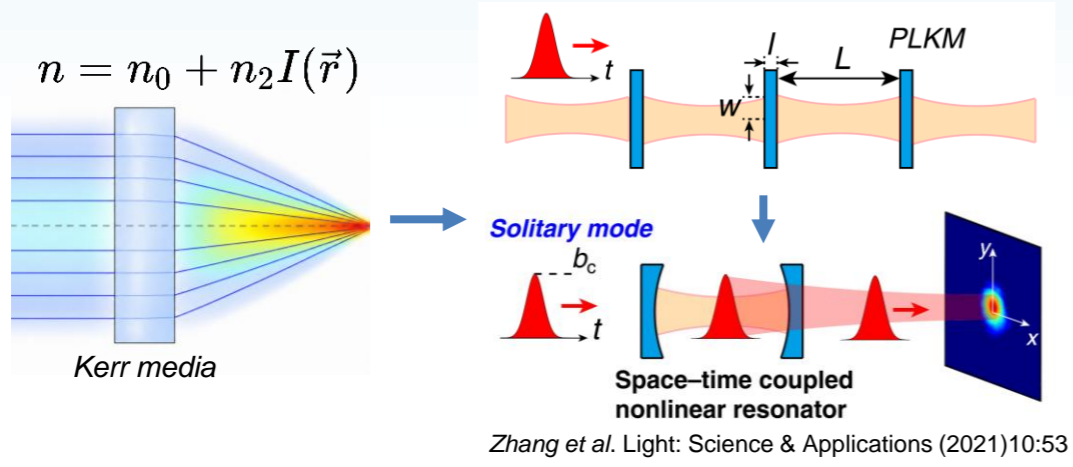


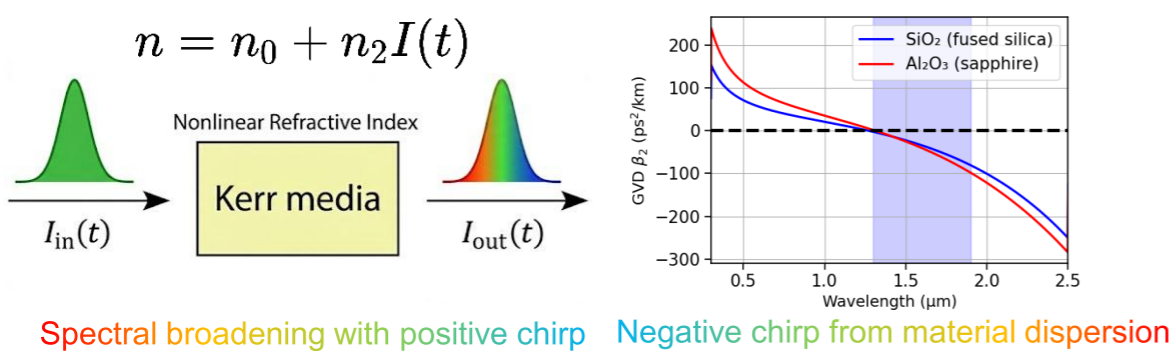
I Introduction

Spatial self-focusing & Solitary mode



Spatial Mode Preservation and Optimization

Temporal self-phase modulation & Self-compression



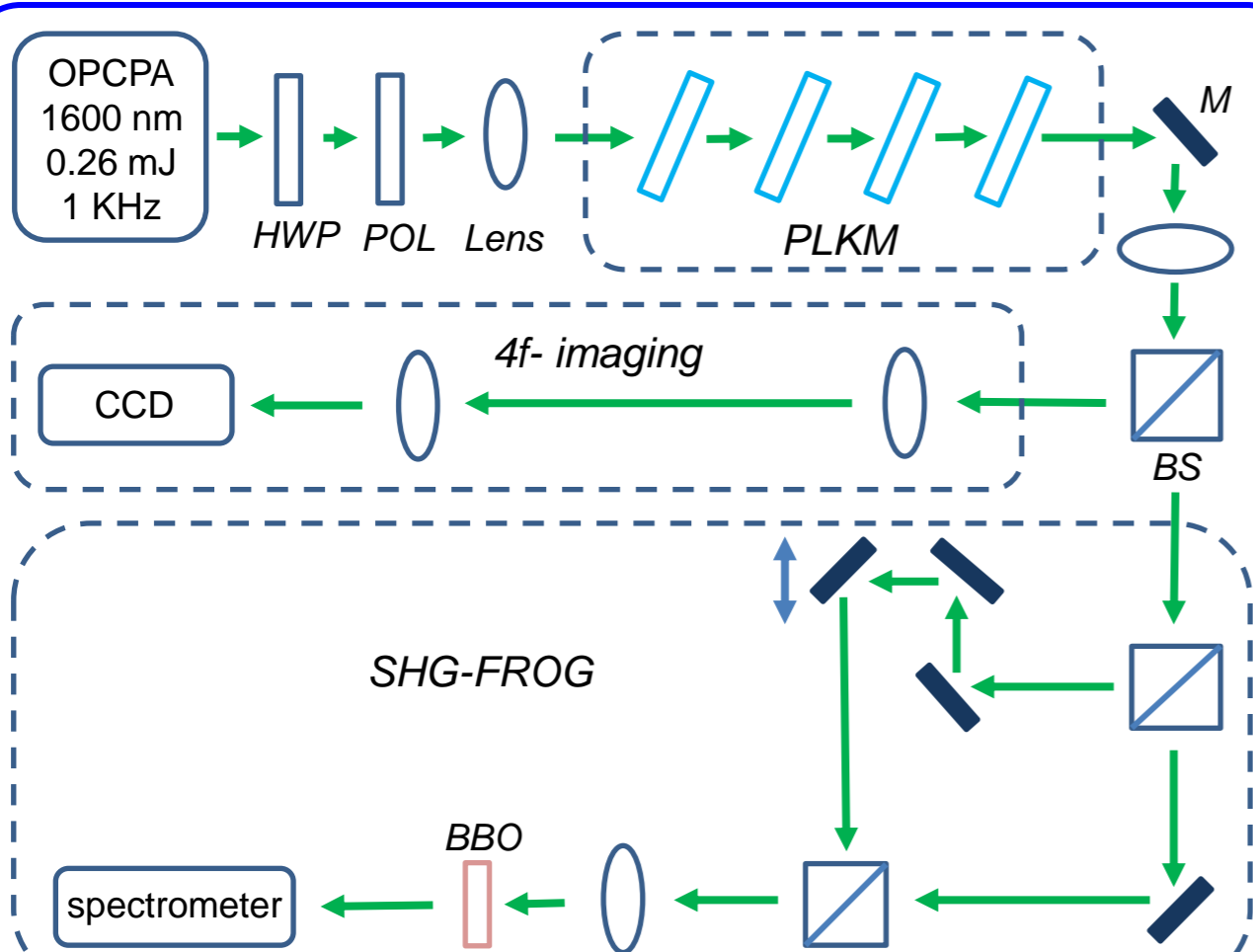
Temporal Pulse Self-Compression

Numerical simulation with the NLSE

$$\frac{\partial U}{\partial z} = \frac{j}{2n_0 k_0} T^{-1} \nabla_{\perp}^2 U + jDU + \frac{j\omega_0}{c} n_2 T \left[(1 - \chi_K) |U|^2 + \chi_K \int_{-\infty}^t h(t-t') |U(t')|^2 dt' \right] U$$

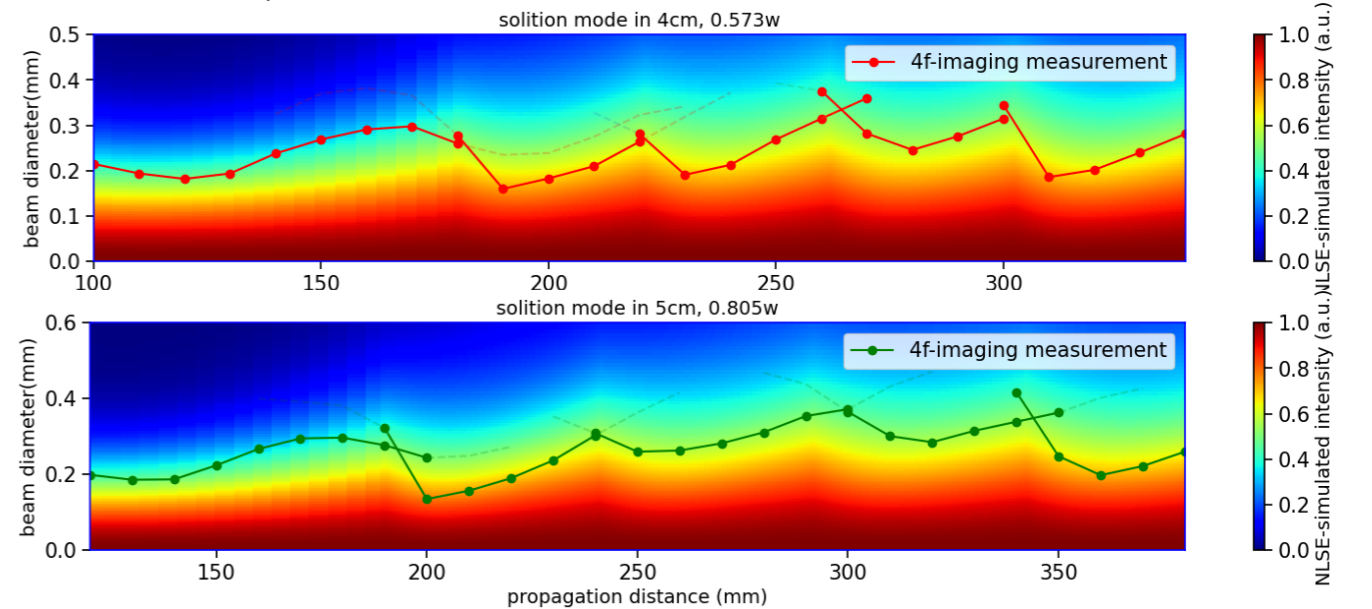
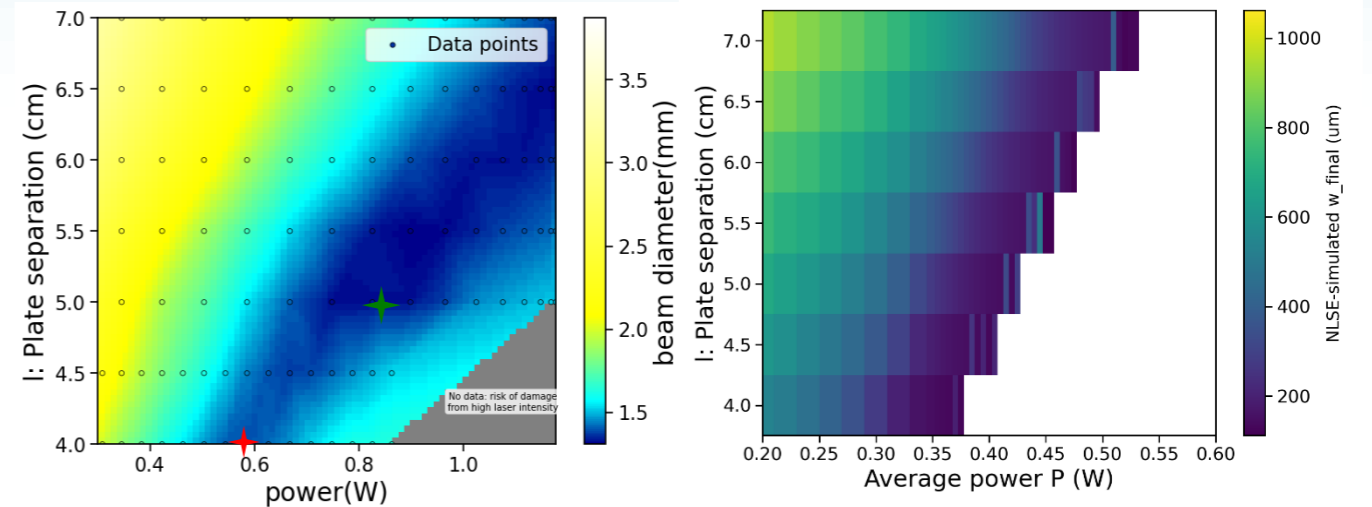
- ∇_{\perp}^2 term: spatial diffraction (beam spreading)
- D term: group-velocity dispersion (GVD)
- $T[\dots]$ term: Kerr self-focusing + Raman-delayed SPM

II experiment

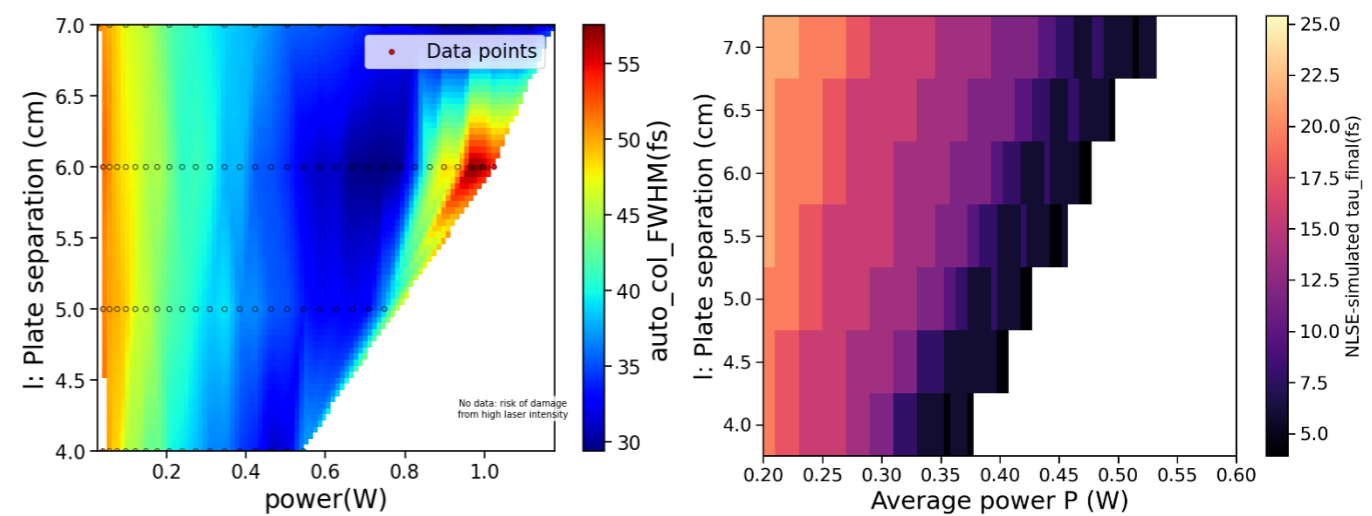


III Main Results

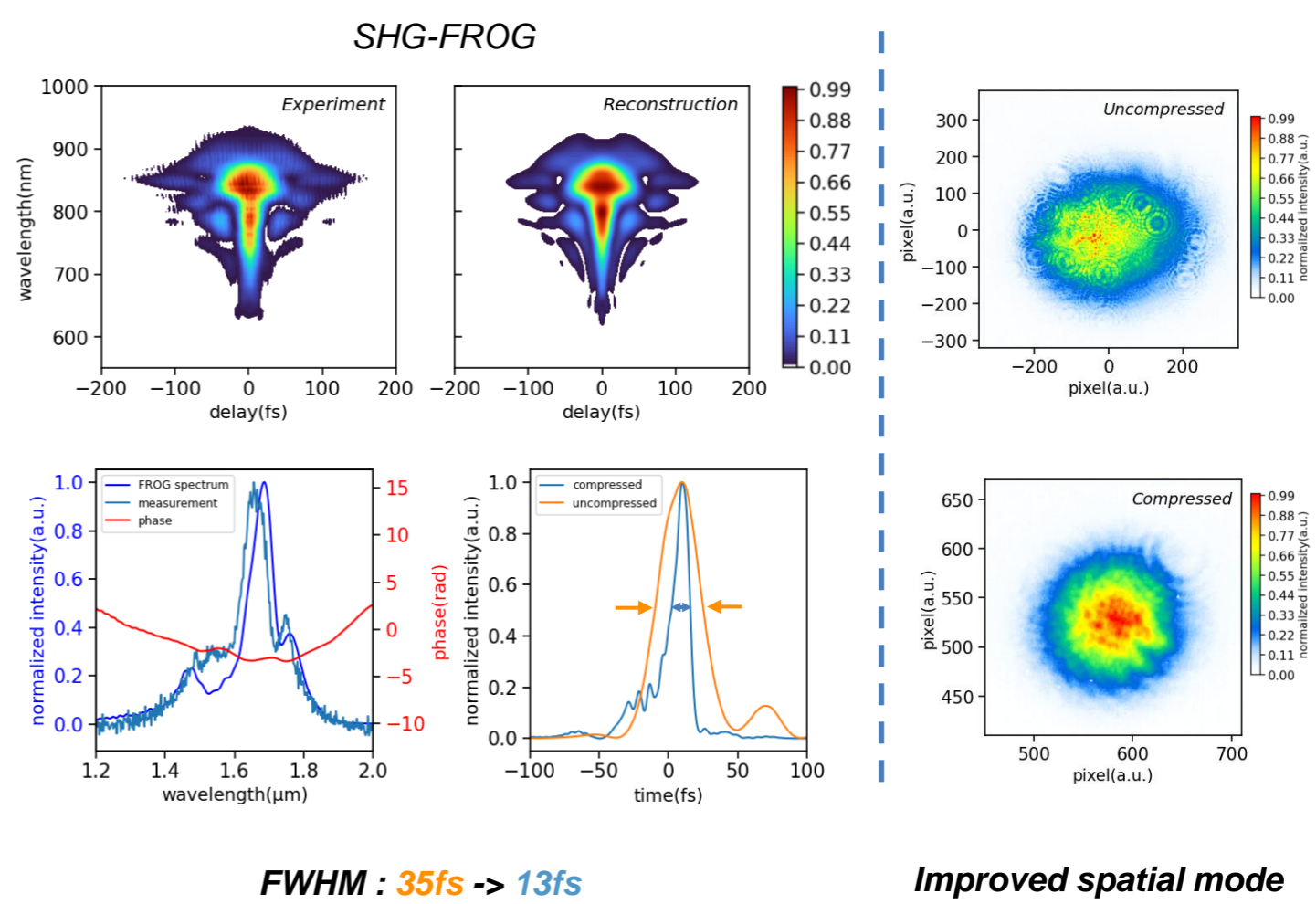
Beam Spatial Evolution & Spot Size



Pulse Duration & Parameter Dependence



Optimized Laser Characteristics



VI Conclusion

1. Soliton-like mode propagation of the optical spot between periodically arranged media has been achieved.
2. Pulse self-compression is realized using a negative-dispersion medium.
3. Self-similar propagation of pulses in both temporal and spatial domains is observed