Introduction:
The wide spectral bandwidth and high spatial coherence of SC light make it unique in nature and is the reason behind its wide range of applications [1]. The spatial, spectral, and temporal coherence properties of SC light generated in fibers are well known [2]. Here we present studies of the spatial and temporal coherence of SC generated by focusing intense femtosecond laser pulses in a 3 mm thick rotating glass plate. A theoretical model is developed to explain the source plane and far-field intensity distribution and spatial coherence of the SC beam. Experiments with a wave-front-folding interferometer (WFI) for the measurement of the spatial coherence confirm the validity of the model. Radial spectra of the beam was also measured and presented.

Experimental setup:

Simulations and observations:

Fig.1: Experimental setup for the measurement of spatial coherence of SC generated by glass plate. L: lens, WP: half wave plate, PBS: polarizing beam splitter, P: prizm, MO: microscope objective. The glass plate was placed at the focus of L and rotated about the principle axis to avoid its ablation and for spatial coherence modulation.

Fig.2: Far-field interference pattern shows bessel correlation. 1)r=36, 2)r=29 3)r=22 4)r=9 micron respectively and $w_0=36$ micron. Left most row (A) shows simulated results for absolute degree of spatial coherence, middle (B) interference fringes, and right most (C) absolute degree of spatial coherence extracted from fringe visibility.

Fig.3: The measured radial (color) spectra for different axial position (index number) of the glass plate.

References: