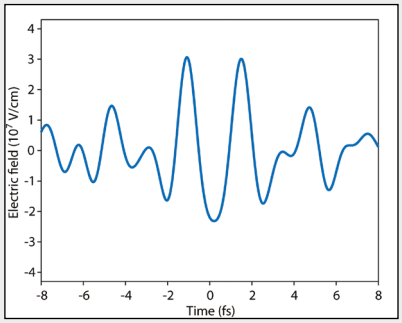
UltraFast Innovations

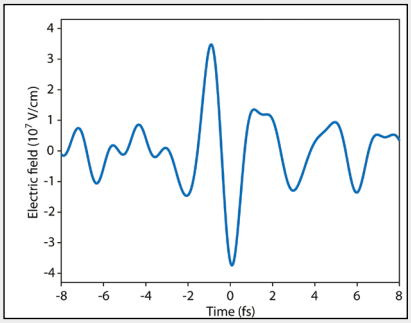
YOUR KEY to innovation and success

# Light Field Synthesizer

# CAPELLA

We present the first commercial Light Field Synthesizer enabling synthesis and sub-femtosecond control of super-octave light transients.


## *Key Product Features:*

- **Shortest pulse available**
  2 fs FWHM
- **Overall transmission**
  >60% @ 9 mm beam
  >70% @ 7 mm beam
- **Parallel pulse compression of multiple channels:**
  <9 fs (700-1000 nm)
  <8 fs (500-700 nm)
  <10 fs (400-500 nm)
- **Attosecond-scale delay among the channels**
- **Interferometric stability**
  Short term passive stability: <100 mrad
  Long term active-loop stability: <50 mrad
- **Incident polarization:**
  s or p polarization
- **Laptop and user-friendly software interface included**
- **Small Footprint:**
  30 x 20 $cm^2$


東京インスツルメンツ TOKYO INSTRUMENTS
グローバルにネットワークを広げ、最先端の科学をお客様に提供

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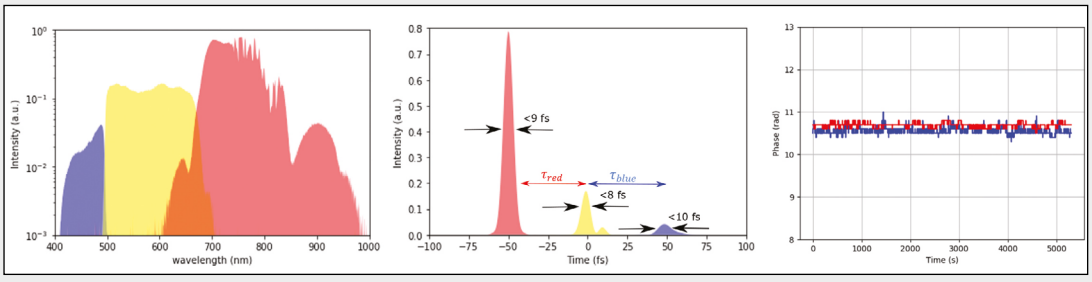
| Specifications: | CAPELLA | | |
|---|---|---|---|
| Number of channels | 3 | | |
| Wavelength range | 400-1000 nm | | |
| Required Input energy | ›290 µJ (700-1000 nm) | ›60 µJ (500-700 nm) | ›14 µJ (400-500 nm) |
| Polarization | s- or p-polarized input light | | |
| Introduced dispersion | › -380 fs² | › -370 fs² | › -560 fs² |
| Temporal accuracy | 2 nm ≙ 7 as | | |
| Maximum delay | 60 ps | | |
| Optics size | 0.5 inch | | |
| Overall transmission | ›60% @9 mm beam<br>›70% @7 mm beam | | |
| Footprint | 30 x 20 cm² | | |

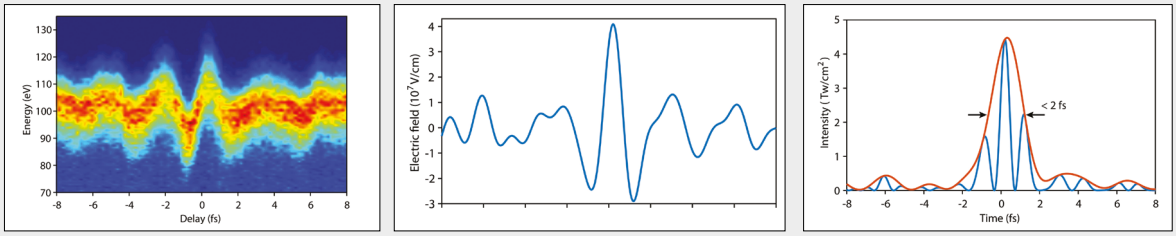
## *Working principle:*

Capella is based on spectral division of a coherent supercontinuum into three different bands (channels) by chirped dichroic beamsplitters [1]. Using an interferometric spatio-temporal superposition a field waveform can be controlled and synthesized. All constituent pulses from the channels of CAPELLA are temporally compressed by chirped mirrors down to pulse duration of ‹10 fs. Introducing different time-delays among the channels enables the shaping and sub-cycle control of the field waveform [2].




*Left: Spectral splitting of the different channels.*
*Center: Parallel channel compression and temporal overlap with attosecond resolution.*
*Right: Passive interferometric stability between different channels over more than an hour.*

Due to its solidness, compactness and excellent thermal capabilities, CAPELLA can maintain the optical pathlength stable among the different channels for many hours. Furthermore, an extra active-controlled loop improves the interferometric stability to ‹50 mrad. Apart from the generation of waveforms, CAPELLA offers the shortest pulses available in market to date, see below:




## *References:*


[1] A. Wirth et al., "Synthesized Light Transients," Science **334** (6053), 195-200 (2011).
[2] M. Th. Hassan et al., "Optical attosecond pulses and tracking the nonlinear response of bound electrons," Nature **530**, 66-70 (2016).