

# SPECIFICATIONS

## 1. One Box KHz Regenerative Amplifier capable of pumping NOPA.

The minimum one box KHz amplifier specifications must be:

- Wavelength: ~800nm
  - Pulse energy:  $\geq 4\text{mJ}$
  - Rep Rate : 1KHz
  - Pulse duration :  $< 50\text{fs}$
  - Beam quality:  $M^2 < 1.3$
  - Energy stability  $< 0.5\%$  rms ( over 8 hrs)
  - Polarization : linear , horizontal
  - Contrast Ratio :  $> 1000: 1$  Pre pulse  
 $100: 1$  post pulse
  - Beam Diameter:  $< 10\text{mm}$
- The Ti:Sapphire oscillator/amplifier system must utilize a thermally-stabilized regenerative cavity to comfortably meet long-term stability specifications
  - Amplifier must be based on slab rod design to provide better heat transfer and lensing characteristics
  - The amplifier must use dual Pockel cells (intra-cavity) in order to allow independent optimization of pulse injection and ejection.
  - The amplifier must include a signal delay generator to allow complete control of the injection timing, ejection timing, synchronization to the seed oscillator and amplifier repetition rate. Timing of injection and ejection pulses must be adjustable with steps as small as 250 psec and with  $< 250$  psec timing jitter. The signal delay generator must be compatible with LabView software drivers.

## Integrated Mode locked One box Titanium Sapphire Laser Oscillator

- Average power :  $\sim 300\text{mW}$  @  $\sim 800\text{nm}$
- RMS noise :  $< 0.1\%$  (10Hz-10MHz)
- Power Stability :  $< \pm 1\%$  over 2 hours period
- Polarization : Horizontal
- Repetition Rate : 80 MHz
- Beam Divergence:  $< 1.3\text{mrad}$
- Beam Diameter :  $< 2\text{mm}$
- Bandwidth :  $> 30\text{nm}$  ( to get  $< 50\text{fs}$  pulse from amplifier conveniently)

Partial output of Oscillator should be available for independent experiments.

The Ti:sapphire oscillator should be pumped with integrated Diode Pumped 532 nm laser having below specs

- Wavelength: 532nm
- Linewidth:  $< 5\text{MHz}$
- Power: 2W
- Spatial Mode: TEM00
- Beam Quality:  $< 1.1$
- Beam Divergence:  $< 0.5\text{mrad}$
- Polarization: vertical,  $> 100:1$
- Power Stability:  $< \pm 1\%$
- Noise:  $< 0.02\%$  ( 10Hz to 100MHz)

### Required Q-switched DPSS Pump Laser for Amplifier

- Wavelength 527nm
  - Pulse Repetition Rate 1kHz
  - Pulse Energy >20mJ @ 1kHz
  - Pulse Energy Stability < 0.5% rms over 8 hour period
  - Pulsewidth < 250ns
  - Beam Divergence < 10mrad
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- The amplifier must have a 527 nm pump laser fully integrated on the same thermally stabilized platform into the amplifier enclosure to provide a thermally stable system, to minimize beam walking, and to minimize sensitivity to changing environmental conditions such as air flow, humidity and temperature.
  - The 527 nm pump laser must be based on diode-pumped technology to ensure long-term shot-to-shot pulse energy stability, and long lifetime.

### **2. Non Co-linear Optical Parametric Amplifier System:**

The NOPA system must have single laptop computer control of all components with unified software control to allow operators to adjust system parameters and verify status of the optimization loops.

- (NOPA) shall have accessories that extended the wavelength range from **500-750 & 850-1000nm**
- Output Pulse duration: 25-70fs
- Acceptable pump Energy at ~800nm: 0.6-0.8mJ
  - < 25 fs @ 530 - 700 nm
  - < 70 fs @ 500 - 530 nm
  - < 70 fs @ 850 - 1000 nm

**All necessary routing & telescopic optics for pumping OPA should be included.**

### **3. Accessories required for the System**

#### **a) Power meter for the system**

Capable of measuring average power output (all wavelengths) of oscillator, amplifier, Pump Lasers and OPAs  
Wavelength range: ~ 300 -10,000 nm  
Power range: few hundred  $\mu$ W to 30 Watt

#### **b) IR Viewer:**

Wavelength range: 350-1500 nm  
Power supply: battery

**The system should include Chillers and Computers/Laptops wherever required**