**Astrella lock-out specifications and design features**

* The entire FS Laser system has been subjected to testing via industrial HALT/HASS certification (Highly Accelerated Stress Screening) chamber, for best reliability and robustness.
* The FS laser Stretcher/compressor assembly is to be temperature stabilized and sealed for enhanced stability and reliability.
  + This ensures best dedicated performance at <35fs. Other systems that offer both 100fs & 35fs capability are not acceptable, as those systems must utilize unsealed Stretcher/compressor assemblies, making them less stable, susceptible to air currents, dirt and contamination.
* The FS Laser amplifier is to use an uncoated Brewster angle Ti:Sapphire rod for best reliability.
  + Alternate designs using orthogonal cut rods require optical coatings and are subject to higher pump power density on the face of the rod compared designs which feature uncoated rods at Brewster angle. This design provides over 20% better cooling efficiency over older, round-rod based systems. Round-Rod design is less robust and is susceptible to premature failure and expensive replacement costs.
* Simple, reliable, water-cooled rectangular cross-section Ti:Sapphire rod in the regenerative amplifier.
  + Alternate configurations using TEC cooling require an environmentally controlled rod housing and introduces additional surfaces (and losses), into the cavity and increases the parts count (TEC, mechanical assembly, electronic driver, purge system for housing etc.). Direct water cooling of the rod makes the system easier to maintain and reduces complexity for better long term reliability and lower running costs.
* All FS laser amplifier cavity optics to be mounted directly to the temperature stabilized baseplate for optimum stability (no mounting posts/clamps located on the regen baseplate).
  + Posts, rods & mounting clamps are inherently less stable and are not acceptable.
* All pump laser routing and telescope optics mounted to temperature stabilized regenerative amplifier subassembly.
  + Doing this makes the laser more stable, and facilitates HALT/HASS certification.
* The Pockels cells are individually shielded to minimize EMI to minimize electrical noise interfering with other sensitive research equipment.
* Independent Pockels cells are used for injection and ejection of the pulse from regenerative amplifier cavity results in separate switch-in and switch-out surfaces for ease of alignment and provides maximum timing flexibility while driving the Pockels cells at the minimum voltages (1/4 wave).
  + This dramatically extends the lifetime of the Pockels cell drivers, lowering the cost of the system and making it more reliable.
* The pump laser must be specified at >38mJ per pulse at 1kHz to provide sufficient operational headroom and enable operation at de-rated power to provide long life
* The UF amplifier must be able to show long term pulse length stability without recourse to active compensation systems which could conflict with data collection and are therefore not acceptable.
  + Active feedback loops on the UF Laser compressor are strictly NOT acceptable as these inherently create noise and pointing instability.
* The UF laser must include a tunable closed box oscillator (Vitara-T) with both, computer controllable bandwidth and center wavelength (spec sheet). This oscillator needs to have the SynchroLock AP option.
  + The Astrella comes with a standard 50% seed beam output port. The oscillator flexibility of the Vitara-T provides therefore additional experimental headroom, independent from the amplifier output.