Rockwell Laser Industries

# Advanced LSO - Calculations Workshop 2-day (L-322)

**Day One:**

**Introduction and Laser Safety Basics**

**Skin & Eye Biological Effects**
- Mechanisms of interaction
- Effects on the skin and eye
- Comparison of injury data to MPE

**MPE Calculations**
- Dual limits for UV hazards
- Limiting apertures
- Correction factors
- Computations of MPEs
- Multiple wavelength analysis

**Calculation Session 1 –Correction Factors and Multiple Wavelengths**

**Hazard Analysis of Gaussian Beams**
- Irradiance and radiant exposure
- Conversion between 1/e and $1/e^2$ values
- Expressing MPE as power or energy
- Optical density calculations

**Calculation Session 2 –OD and Conversions**

**Dual Limits and Multiple Pulses**
- Dual limits in 1200 nm to 1400 nm band
- Three rules for multiple pulses
- Crossover frequency
- Pulse groups

**Calculation Session 3 –MPE for Multiple Pulses and Pulse Groups**

**Day Two:**

**Extended Source Exposure**
- Comparison of injury data to MPE for extended sources
- Criteria for extended sources
- Diffuse reflections
- Radiance and thermal MPEs

**Calculation Session 4 –Extended Source Exposure**

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**MPEs Based on Both Thermal and Photochemical Effects**
- Longer exposure durations
- Blue light correction
- Limiting cone angle
- Small and large sources
- Correction factor method for photochemical MPEs

**Calculation Session 5 – Dual Limits**

**Laser Hazard Classification**
- Concepts of hazard classification
- Limiting apertures
- Measurement apertures
- Current Federal classification

**Calculation Session 6 – Classification by Federal Standard**

**IEC 60825-1-2007 hazard classification**
- Time base
- Reference Points
- Extended source AELs
- Correction for multiple pulses

**Calculation Session 7 – Classification by IEC 60825-1-2007**

**IEC 60825-1-2014 hazard classification**
- Changes to extended source AELs
- Changes to correction for multiple pulses

**Calculation Session 8 -- Classification by IEC 60825-1-2014**