Sum Frequency Mixing with 355 nm

The SFM-355 mixing unit is designed to generate laser radiation in the UV wavelength range, from 216 nm to 241 nm. It is operated together with a Cobra-Stretch or PrecisionScan dye laser, pumped by an injection seeded frequency doubled Nd:YAG laser. Generation of wavelengths around 220 nm by mixing is an alternative to the use of frequency doubled (SHG) blue dyes pumped by the frequency tripled YAG. The advantage of this approach is the superior lifetime of the used dyes and the smaller spectral bandwidth of the generated UV radiation. On the other side a seeded pump laser is required and the set-up is more complex.

Principles

The dye laser is operated in the red spectral range, from 545 nm to 751 nm. Its output beam is sum frequency mixed with the frequency tripled Nd:YAG radiation. A pair of Pellin-Broca prisms separate the generated UV beam from the dye and Nd:YAG beams.

Tuning Range

Tuning curves with different dyes, when using approximately 600 mJ @ 532 nm for dye pumping and 300 mJ @ 355 nm for mixing.
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Energy Output

<table>
<thead>
<tr>
<th>Pump Laser</th>
<th>Dye Laser</th>
<th>Output Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 mJ @ 532 nm, 300 mJ @ 355 nm</td>
<td>Cobra-Stretch-LG-24</td>
<td>17 mJ</td>
</tr>
<tr>
<td>400 mJ @ 532 nm, 200 mJ @ 355 nm</td>
<td>Cobra-Stretch-LG-24</td>
<td>11 mJ</td>
</tr>
</tbody>
</table>

General Characteristics

- **Wavelength range**: 216 - 239 nm (with 2400 lines / mm, single grating)  
  216 - 236 nm (with 2400 lines / mm, double grating)  
  220 - 241 nm (with 1800 lines / mm)
- **Maximum Pump Energy**: 650 mJ @ 532 nm  
  1000 mJ @ 532 nm $^1$
- **Seeder for Nd:YAG Laser**: Imperative
- **Dye Laser Resonator**: 2400 lines / mm gratings recommended  
  1800 lines / mm gratings possible
- **Dye Laser Amplifier**: Enhanced Beam Profile cell recommended
- **Repetition Rate**: 10 Hz recommended
- **Crystal**: BBO, type I
- **Crystal Tuning Mode**: Look-up table (Autotracking optional)
- **UV Beam Polarization**: Horizontal, >98%
- **UV Beam Diameter (typical)**: 3 - 6 mm, depending on amplifier cell type
- **UV Beam Divergence**: < 0.5 mrad

$^1$ with secondary main amplifier, only possible with PrecisionScan dye laser

Dimensions

- SFM-355 (side view)
- SFM-355 (dye input end)
- SFM-355 (uv output end)

All Dimensions in mm  
Specifications are subject to change without notice