Hybrid Ti:S/KrF laser facility GARPUN MTW for combined subps/ ns laser-matter interaction studies

Presented by: Vladimir Zvorykin with collaborators:

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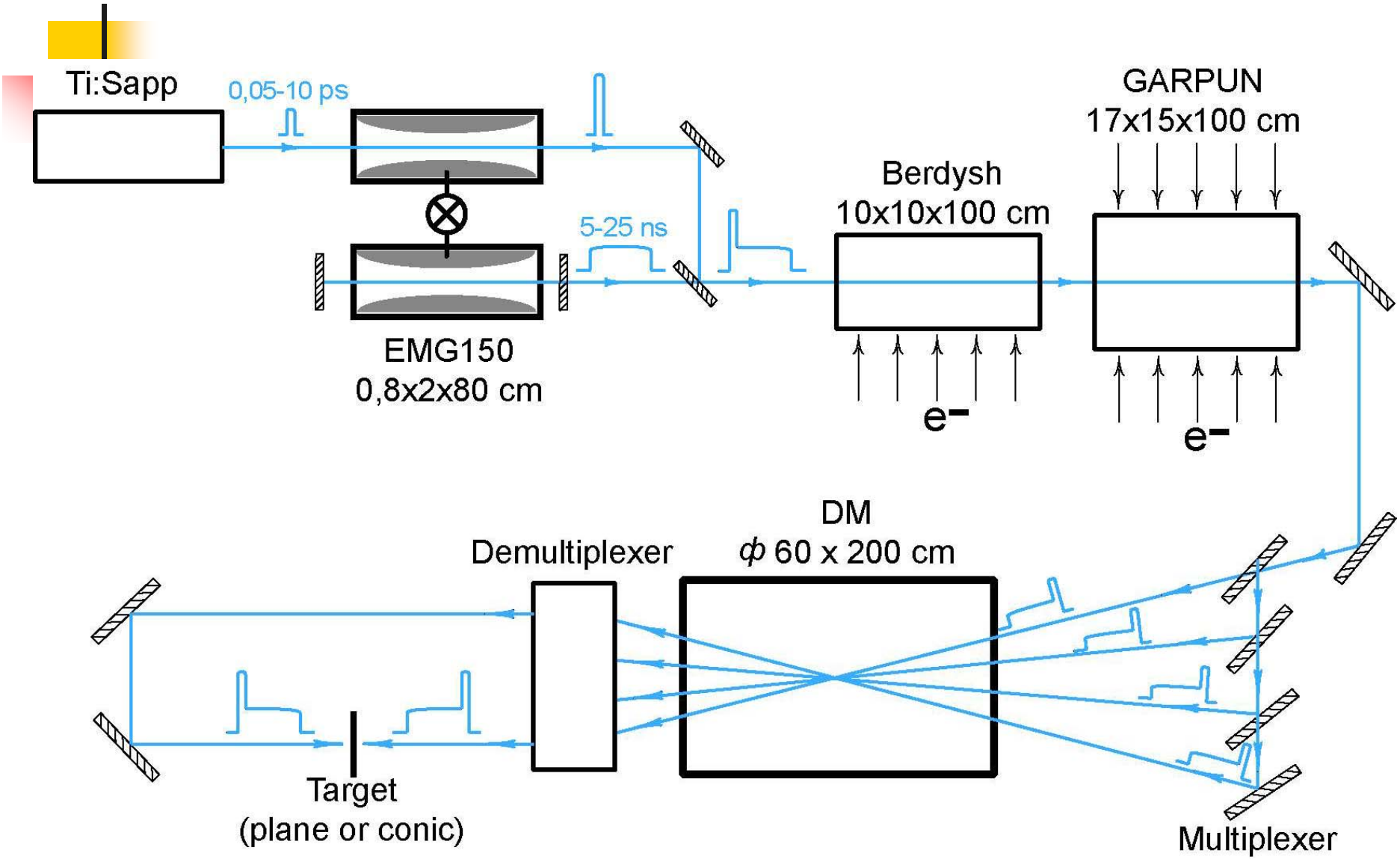
Ti:S : 10 Hz @ 60 fs @ 8 mJ (λ=744 nm) or 0.5 mJ (λ= 248 nm)

KrF: λ=248 nm @ 100 J @ 100 ns or 30 J @ 20 ns; $\leq 5*10^{12}$ W/cm^2

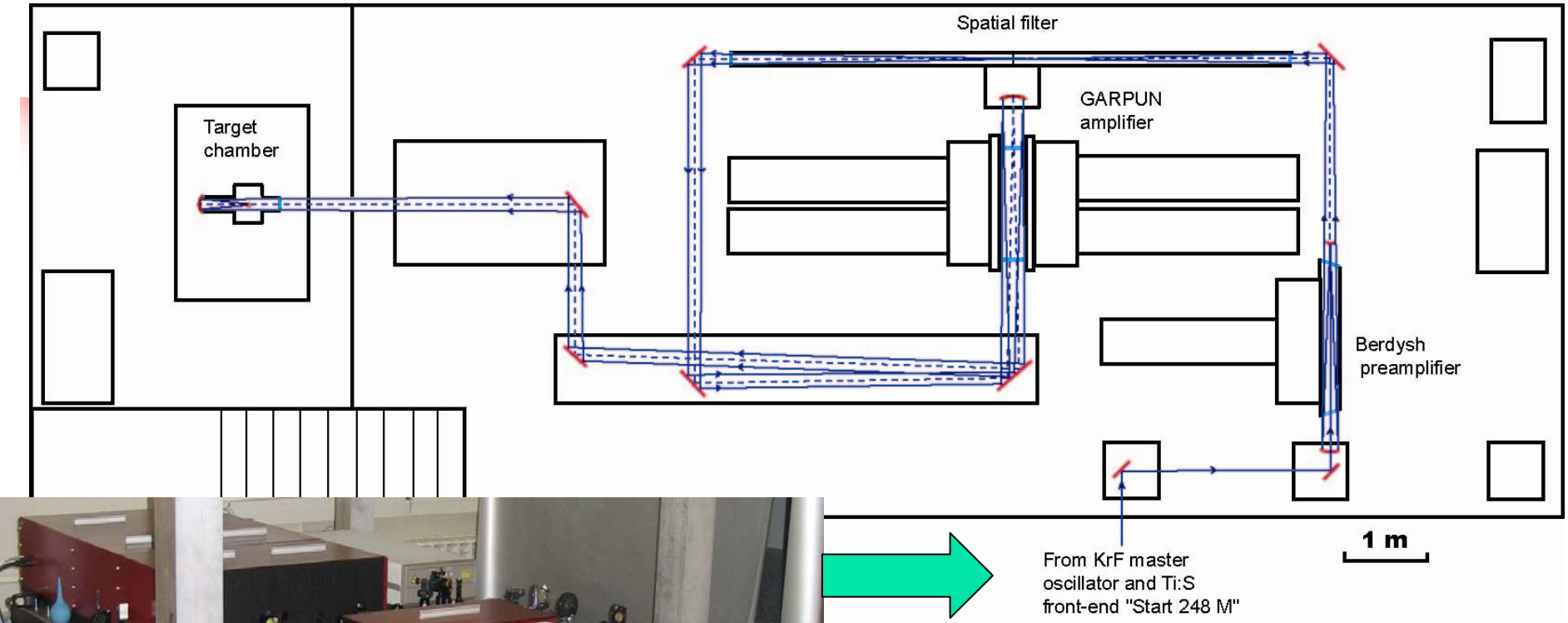
Ti:S/KrF: λ=248 nm @ 1.5 J @ < 1 ps @ ~ 10^{18} W/cm^2 &

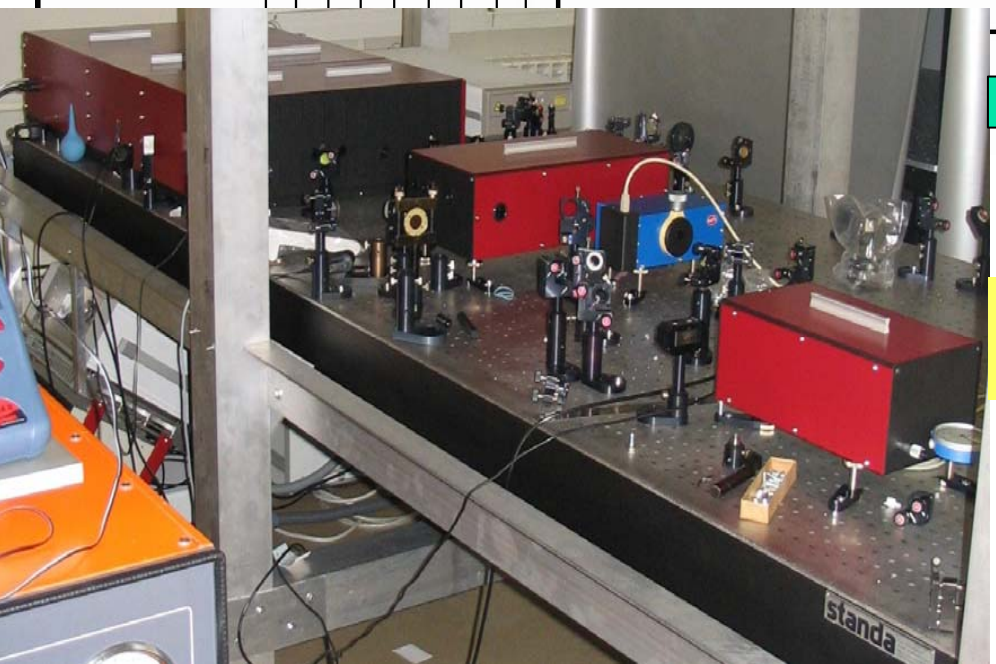
100 J @ 100 ns or 30 J @ 20 ns @ ~10^{14} W/cm^2 (expected)

Schematics of short & long pulses amplification in KrF amplifiers



Amplification of short & long pulses in e-beam-pumped KrF amplifiers





Ti:S front-end “Start 248M”: 10 Hz; 60 fs; 8 mJ (λ=744 nm) or 0.5 mJ (λ= 248 nm)

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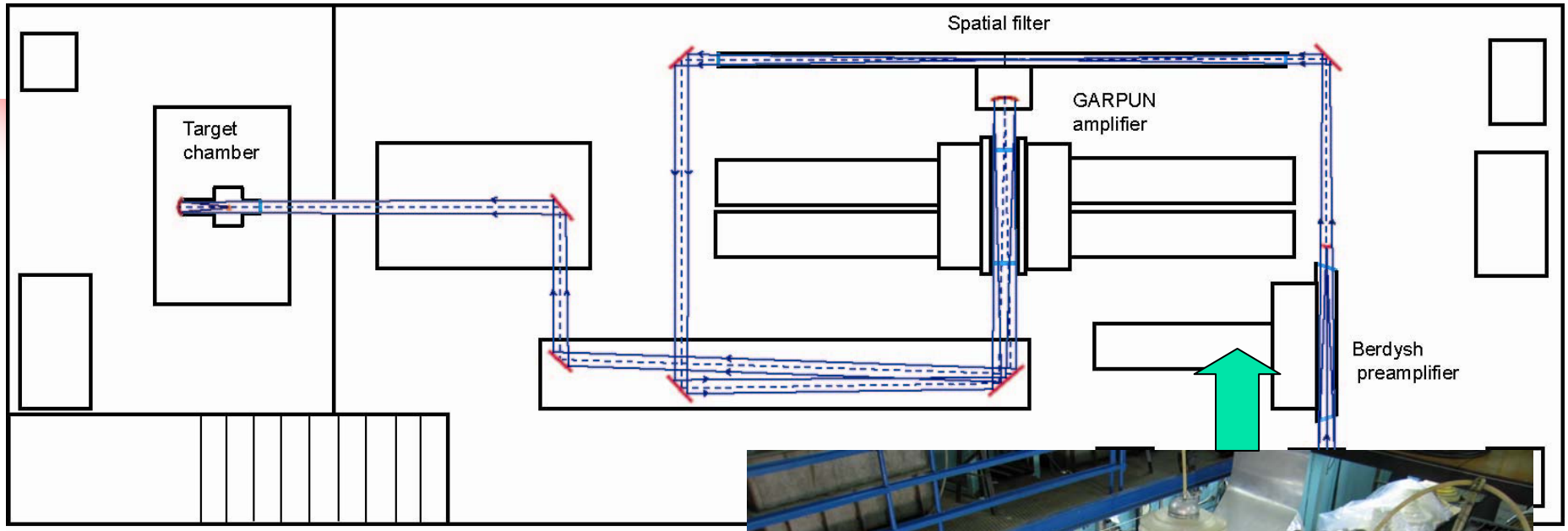
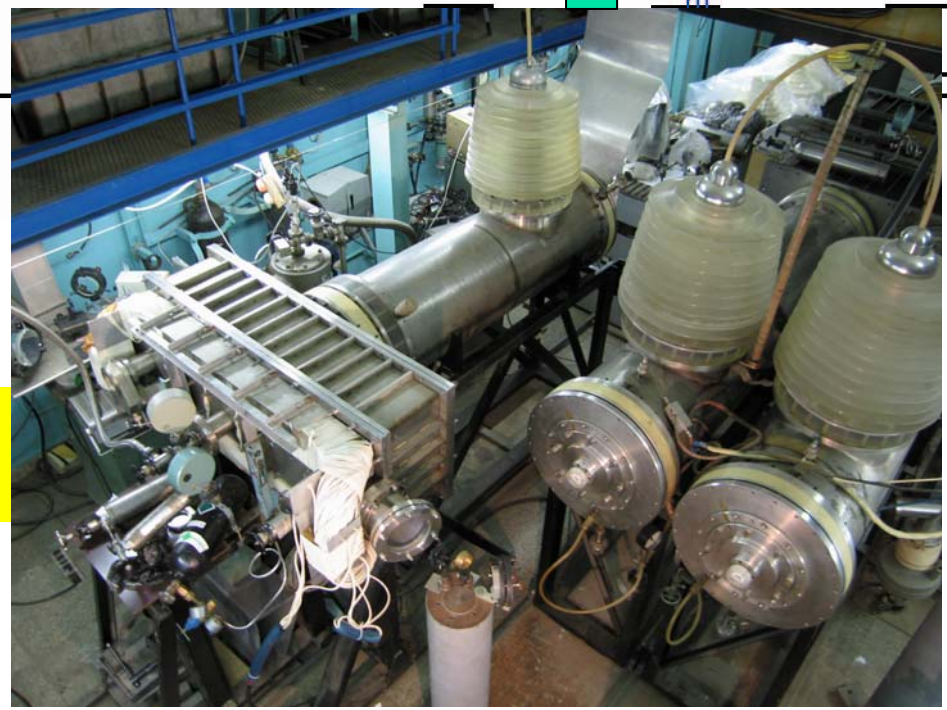
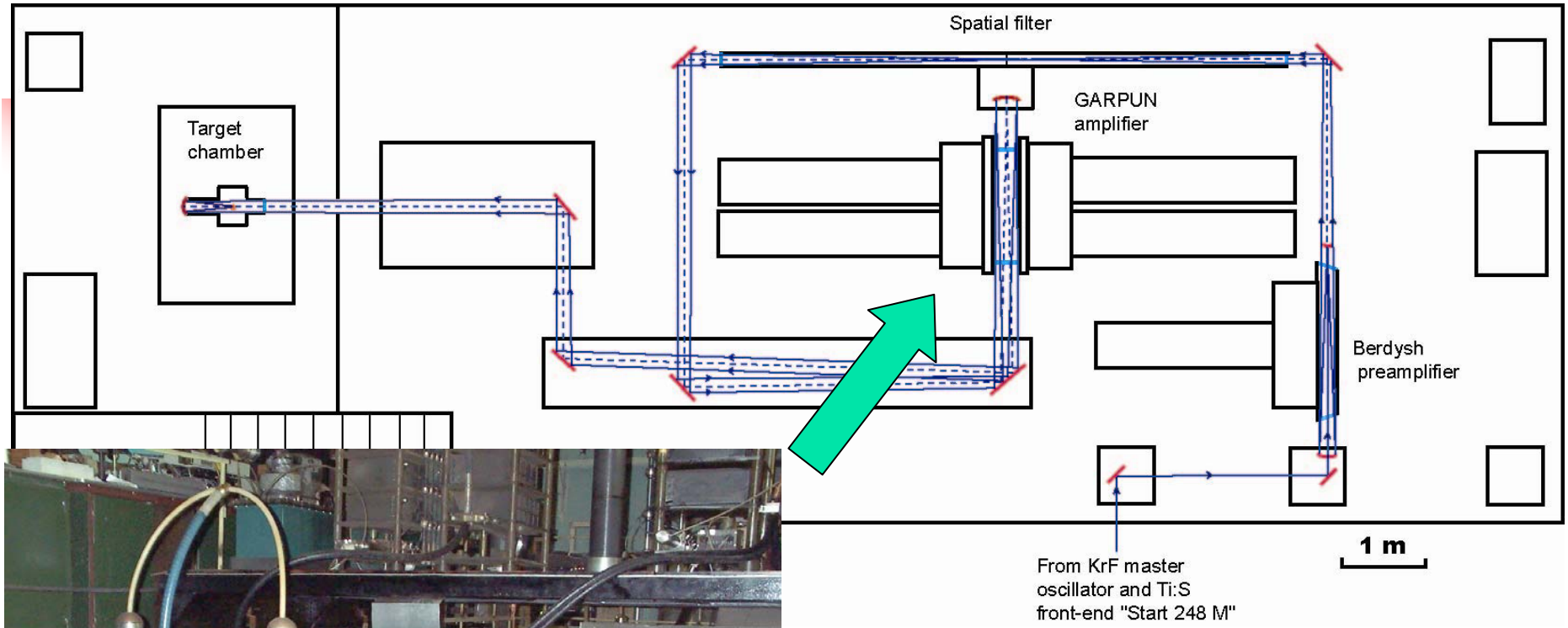
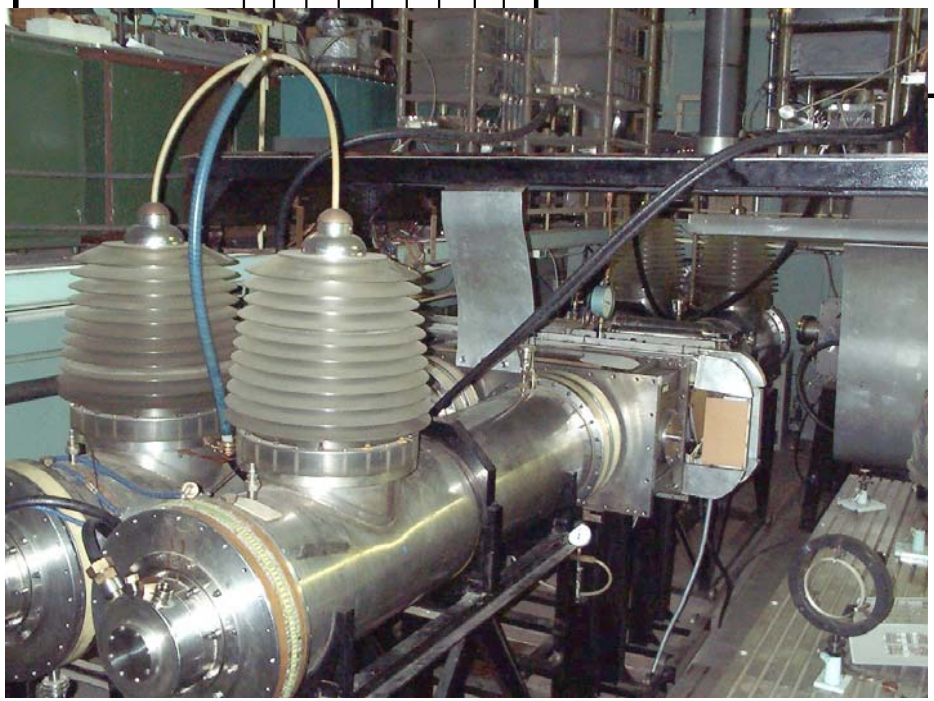




Berdysh e-beam-pumped preamplifier: 10*10*100 cm, 25J, 100 ns, ~ 0.1 mrad

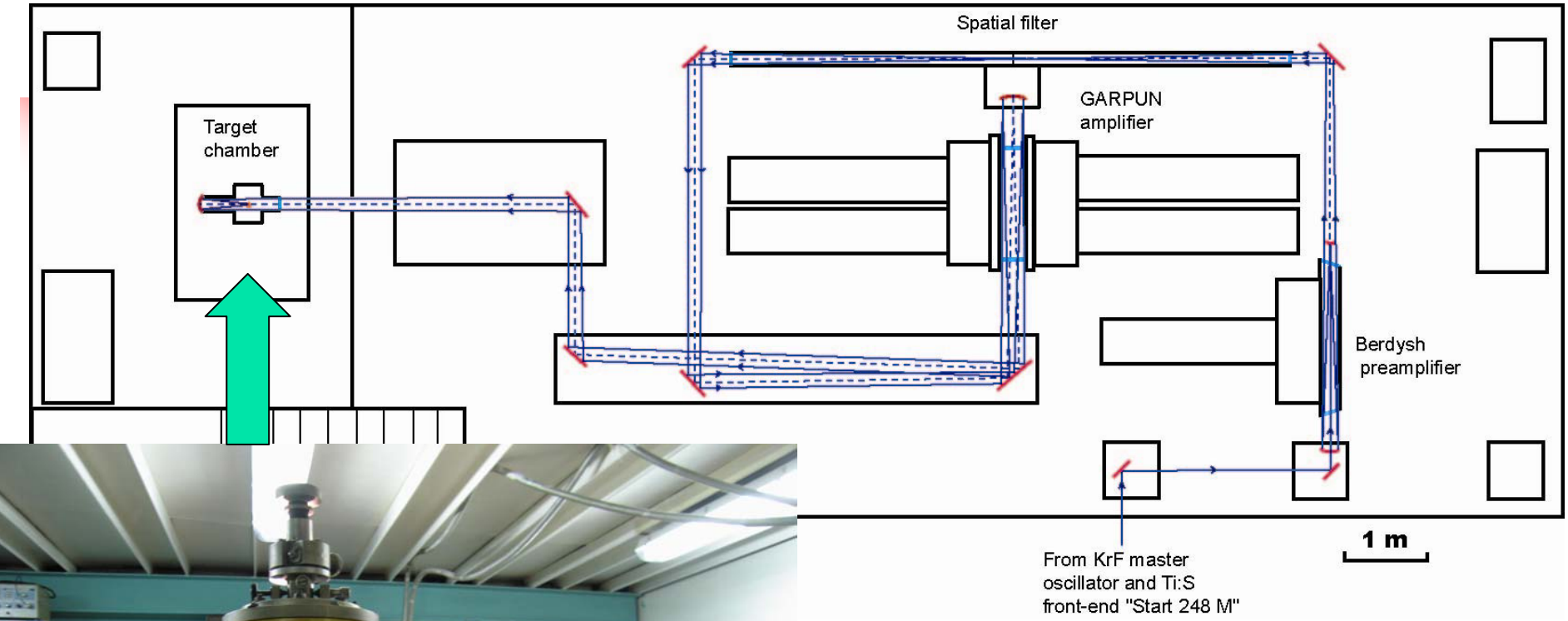
Amplification of short & long pulses in e-beam-pumped KrF amplifiers





GARPUN e-beam-pumped amplifier: 16*18*100 cm, 100J, 100 ns, ~0.1mrad

Amplification of short & long pulses in e-beam-pumped KrF amplifiers

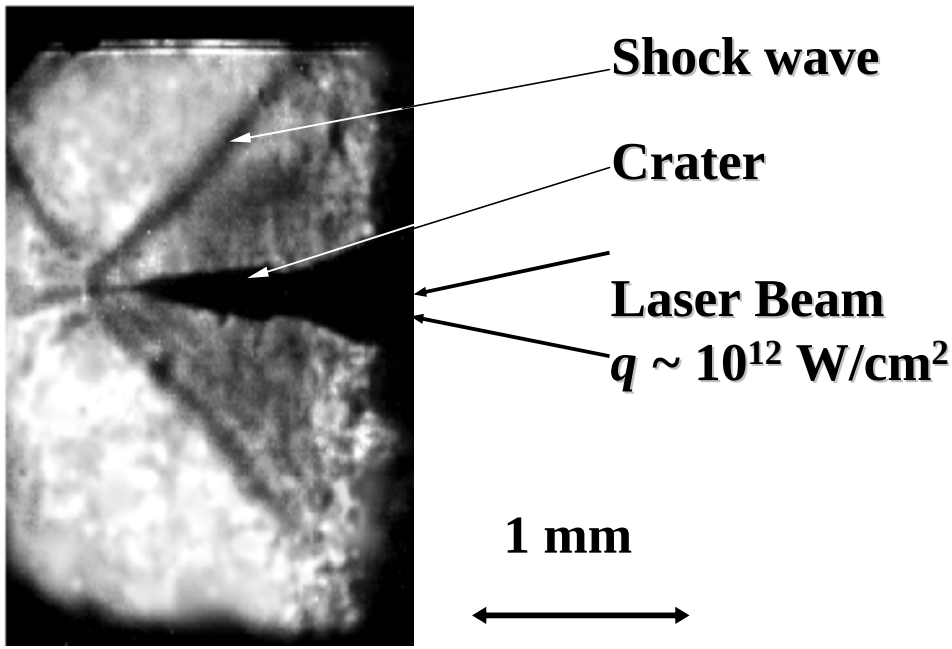


Target chamber

Previous long pulse- target interactions:

E_L~100 J, τ=100 ns, ∅ 150 μm, $q \leq 5*10^{12}$ W/cm^2

- Supersonic motion of the ablation front with Mach-cone SW
- Elongated crater formation
- Generation of 0.5-MeV fast electrons
- Graphite-diamond phase transformation



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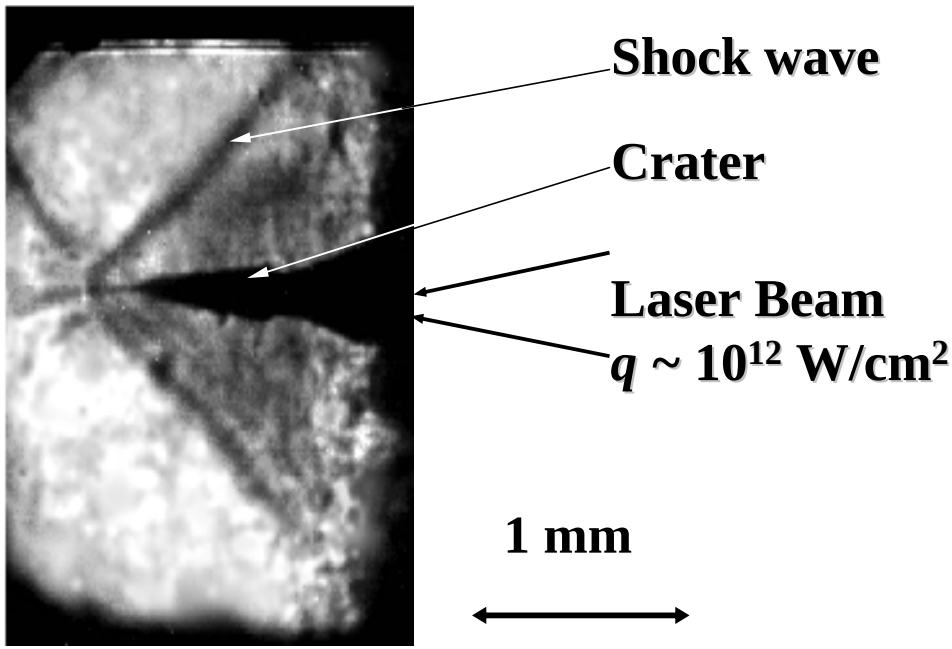
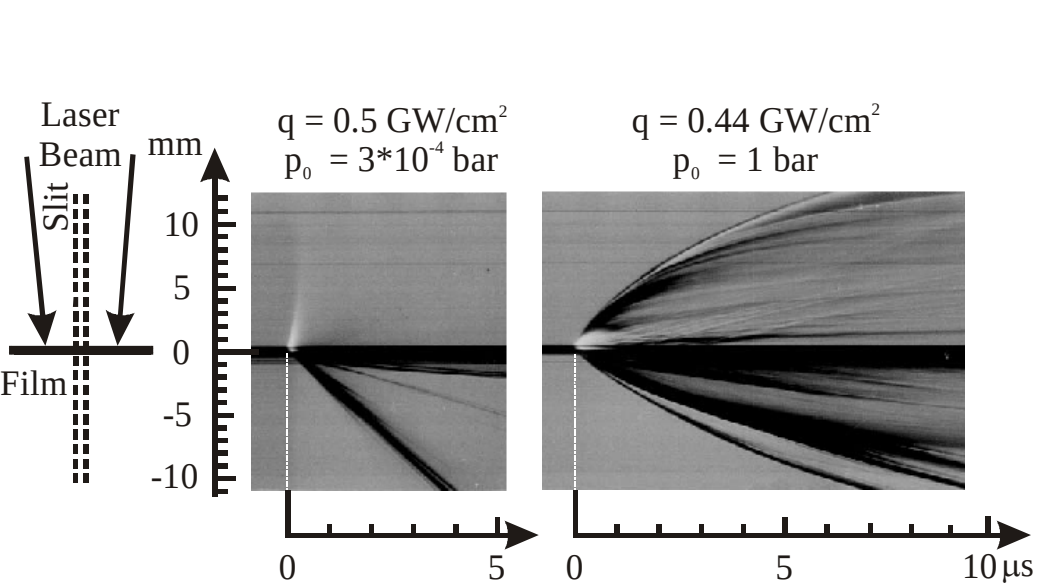
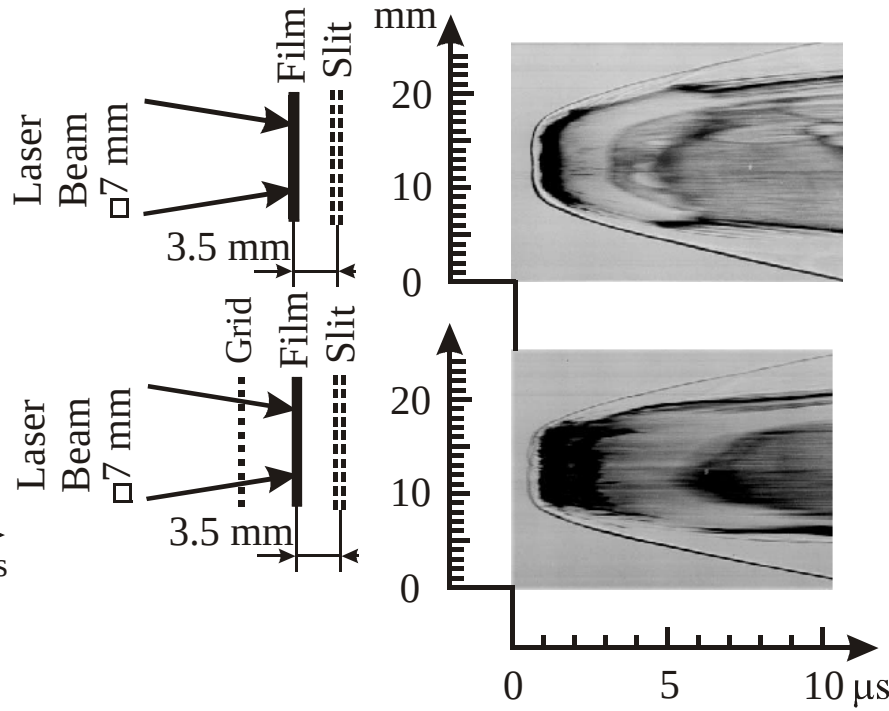


Previous long pulse- target interactions:

E_L~100 J, τ=100 ns, □ 7 mm, $q \leq 10^9$ W/cm^2

- Planner SW generation in gaseous and liquid matter
- Hydrodynamic instabilities development





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