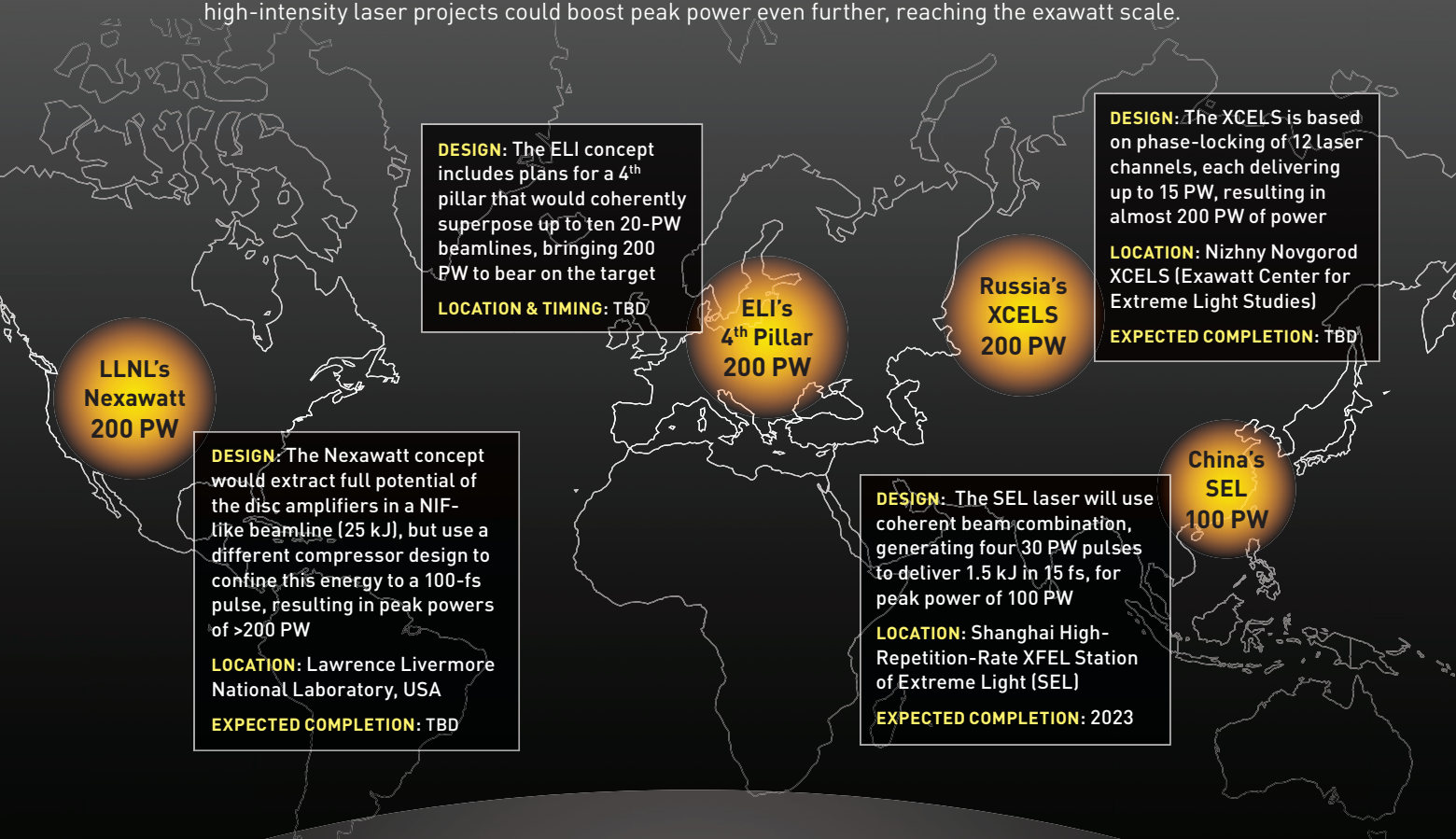


# Toward Exawatt Power

With up to 10 petawatts of peak laser power, the EU's three ELI facilities include the most powerful lasers to date (see cover story, p. 30). A planned fourth ELI pillar and a few other high-intensity laser projects could boost peak power even further, reaching the exawatt scale.



**LLNL's Nexawatt**  
200 PW

**DESIGN:** The Nexawatt concept would extract full potential of the disc amplifiers in a NIF-like beamline (25 kJ), but use a different compressor design to confine this energy to a 100-fs pulse, resulting in peak powers of >200 PW

**LOCATION:** Lawrence Livermore National Laboratory, USA

**EXPECTED COMPLETION:** TBD

**DESIGN:** The ELI concept includes plans for a 4<sup>th</sup> pillar that would coherently superpose up to ten 20-PW beamlines, bringing 200 PW to bear on the target

**LOCATION & TIMING:** TBD

**ELI's 4<sup>th</sup> Pillar**  
200 PW

**Russia's XCELS**  
200 PW

**DESIGN:** The XCELS is based on phase-locking of 12 laser channels, each delivering up to 15 PW, resulting in almost 200 PW of power

**LOCATION:** Nizhny Novgorod XCELS (Exawatt Center for Extreme Light Studies)

**EXPECTED COMPLETION:** TBD

**China's SEL**  
100 PW

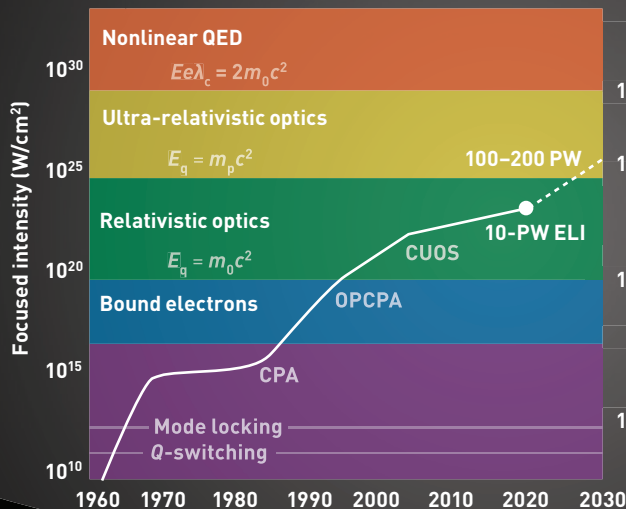
**DESIGN:** The SEL laser will use coherent beam combination, generating four 30 PW pulses to deliver 1.5 kJ in 15 fs, for peak power of 100 PW

**LOCATION:** Shanghai High-Repetition-Rate XFEL Station of Extreme Light (SEL)

**EXPECTED COMPLETION:** 2023

## HIGH-INTENSITY LASER INTERACTIONS

Intensity depends on both laser power and spot size



## FIELDS OF STUDY

