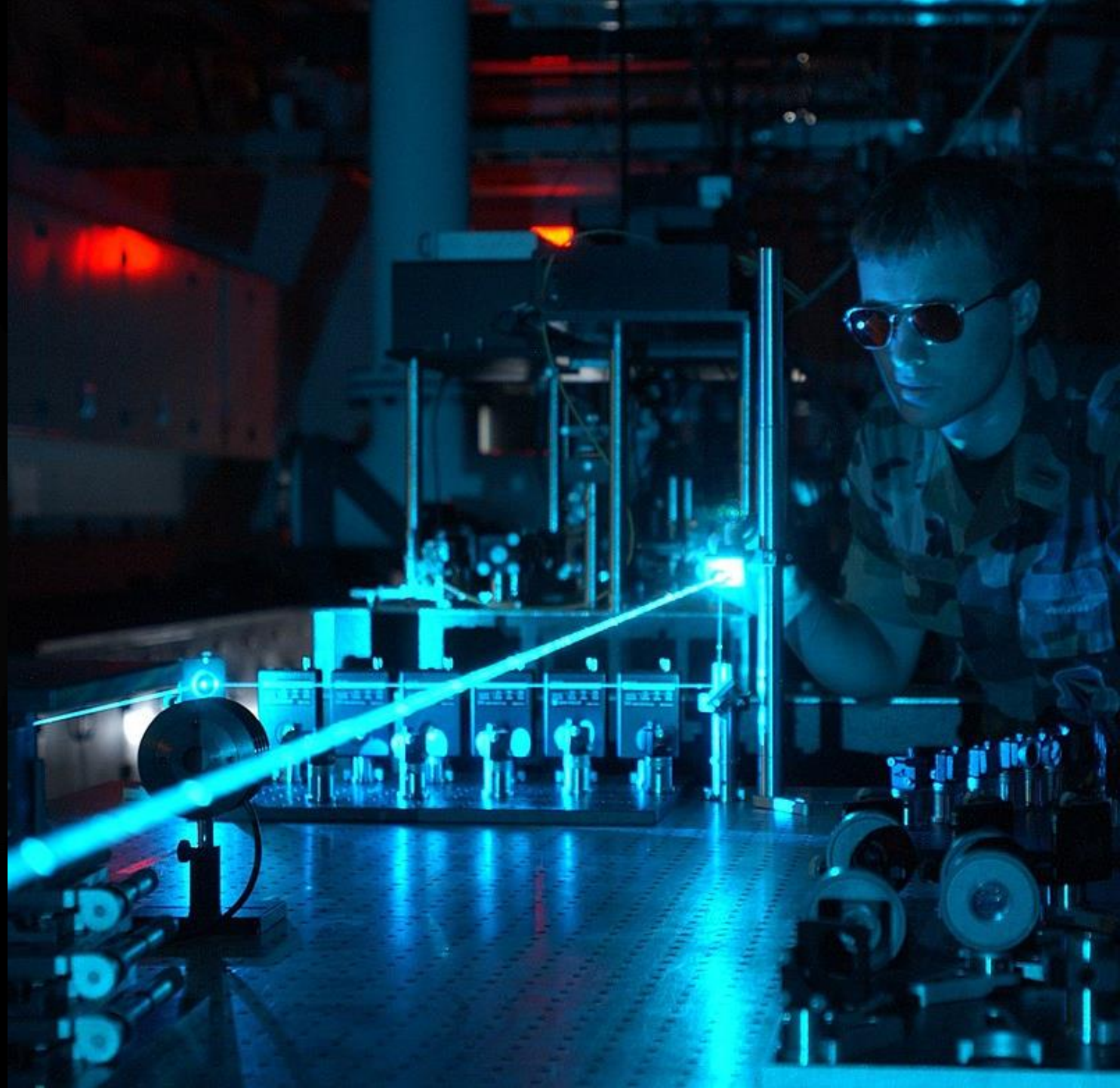
LASERY: SVĚTELNÉ MEČE VĚDY

Lukáš Nádvorník

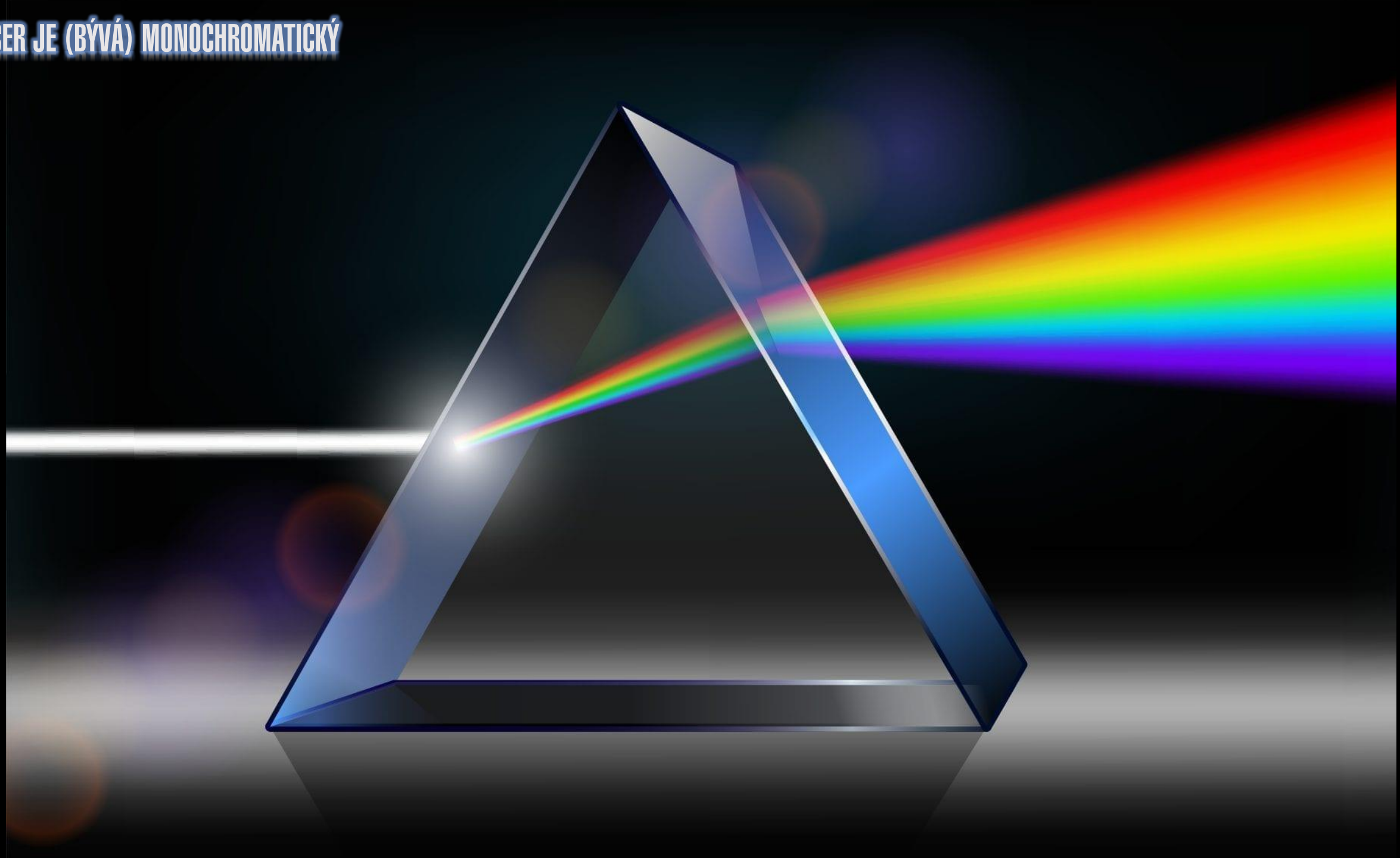
matfyz


STAR WARS: SKRYTÁ HROZBA

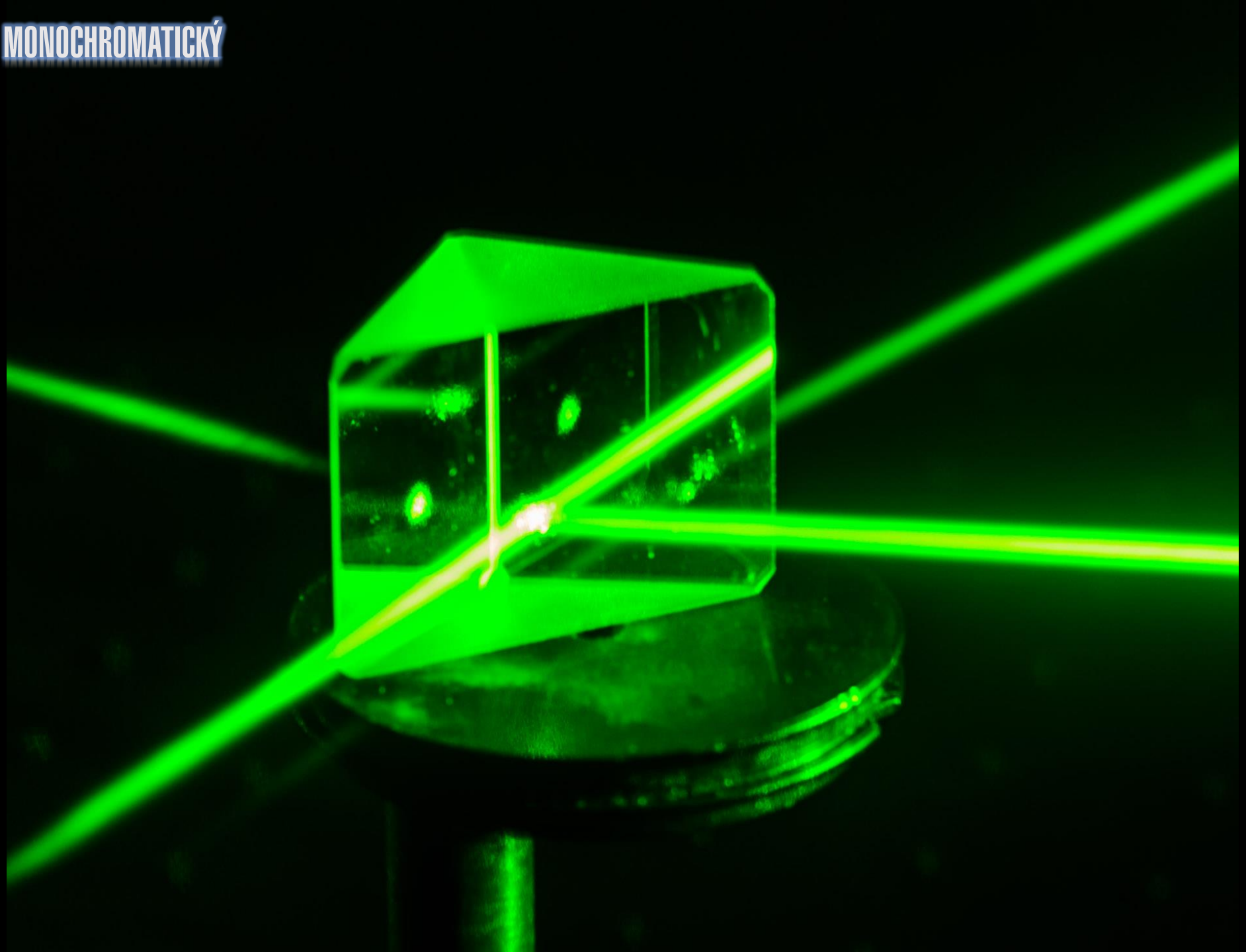
CO JE LASEROVÉ SVĚTLO?



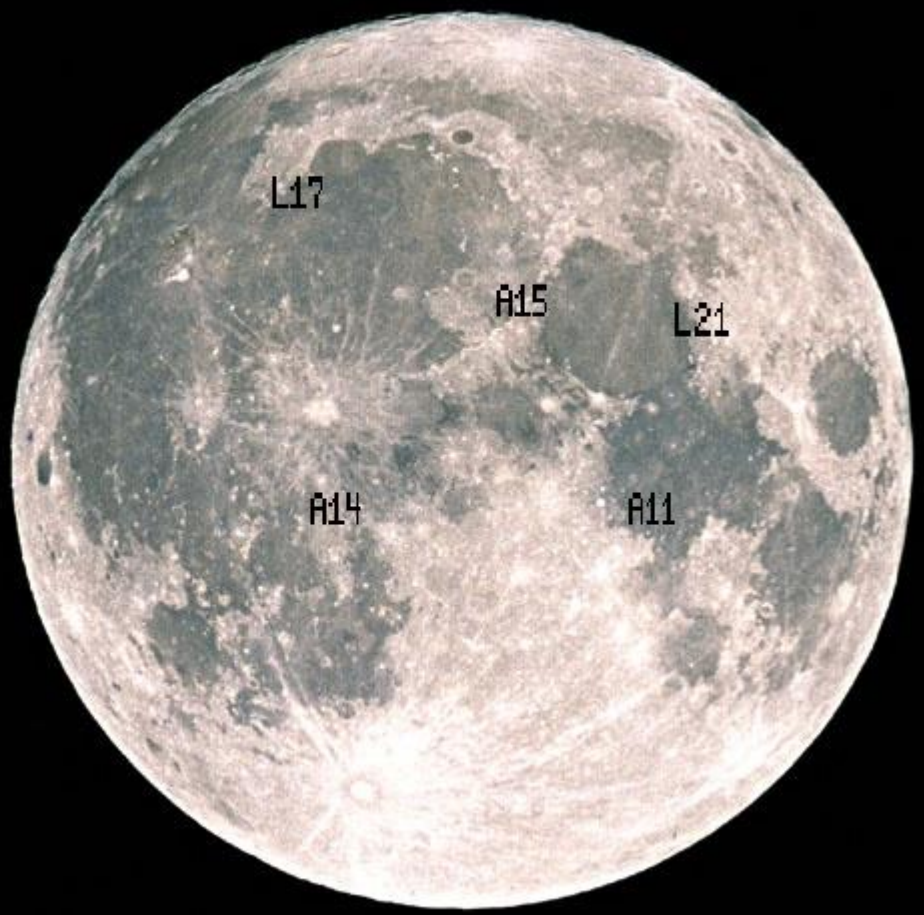
LASER JE (BÝVÁ) MONOCHROMATICKÝ



LASER JE (BÝVÁ) MONOCHROMATICKÝ



LASER MÁ MALOU DIVERGENCI



APOLLO 11

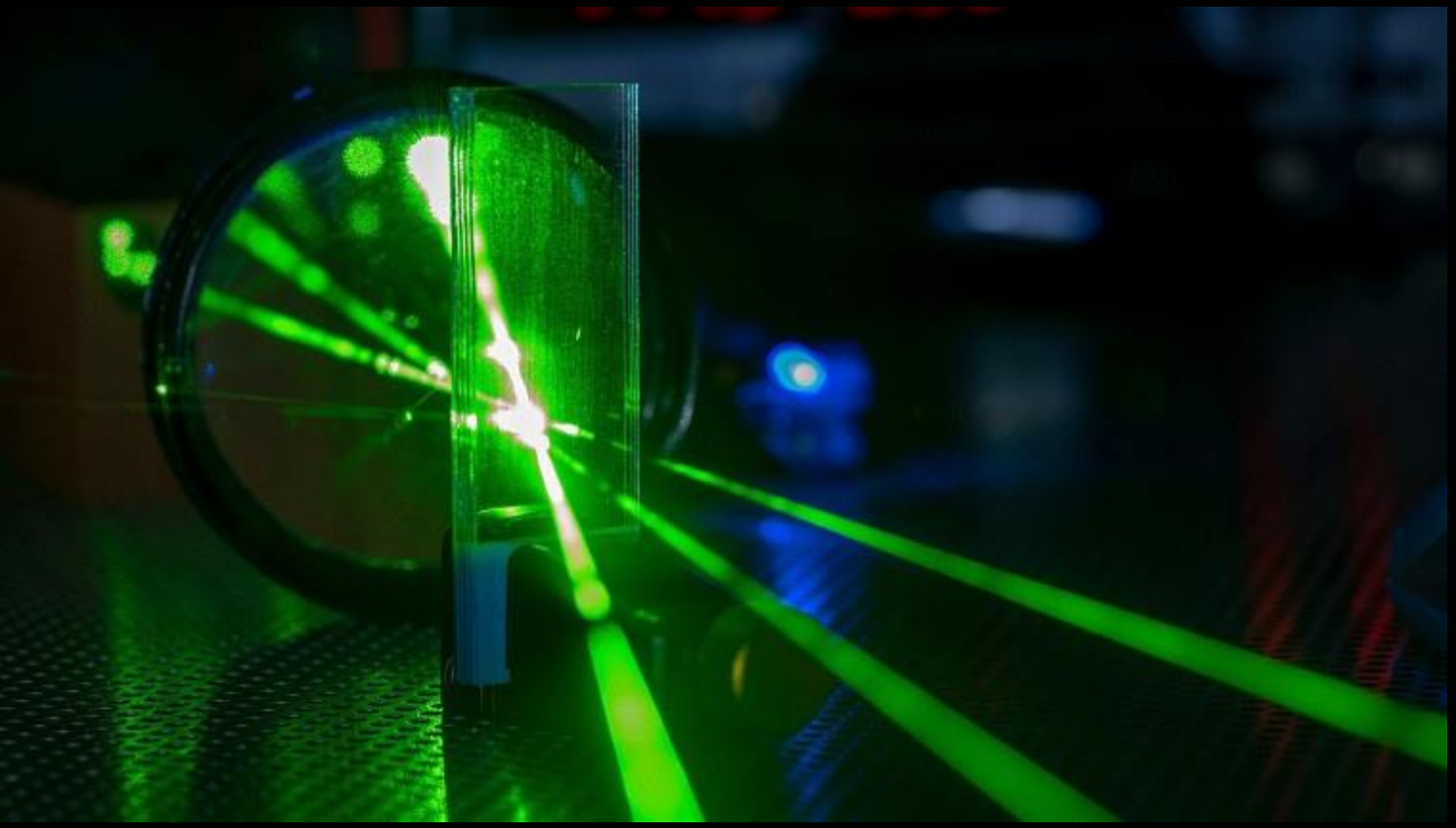
GODDARD'S LASER RANGING FACILITY


SAN ANTONIO, TEXAS


SAN ANTONIO, TEXAS

LASER LZE ÚŽASNĚ ZAOSTŘIT

LASER LZE ÚŽASNĚ ZAOSTŘIT



Ukazovátko 1 mW zaostřeno na 1 µm

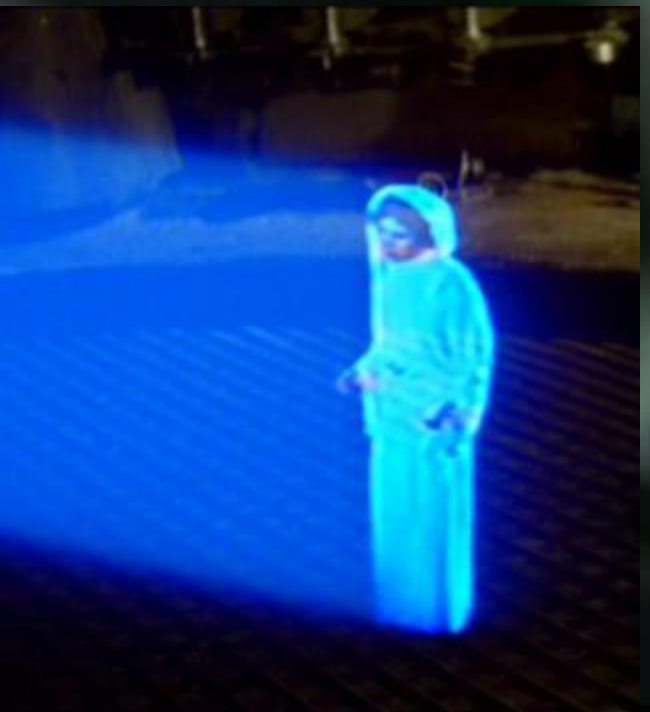
sporák
100 kW/m^2

Jádro nukleárního reaktoru
3 MW/m^2

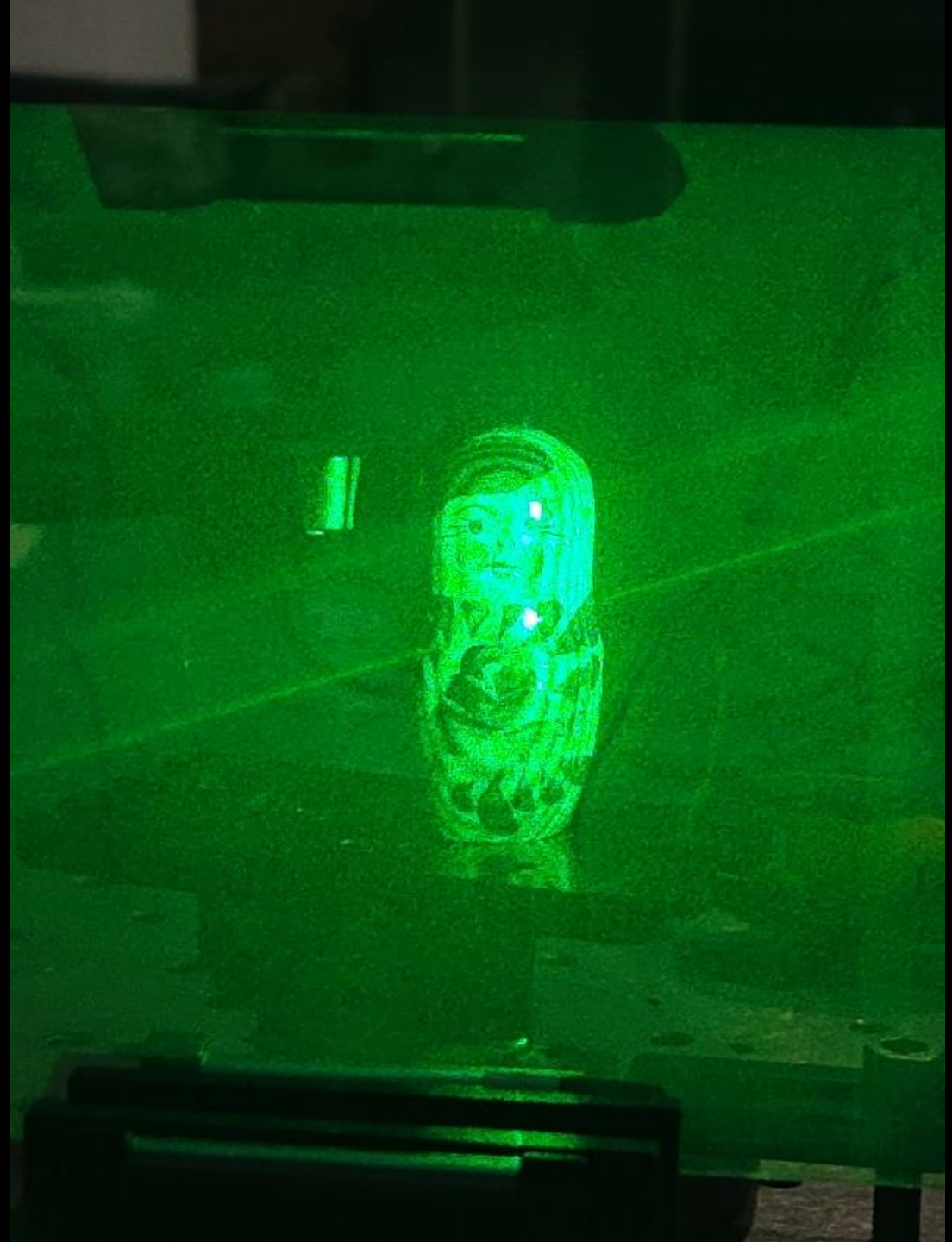
Raketová tryska
20 MW/m^2

Povrch Slunce
65 MW/m^2

LASER JE KOHERENTNÍ



LASER JE KOHERENTNÍ

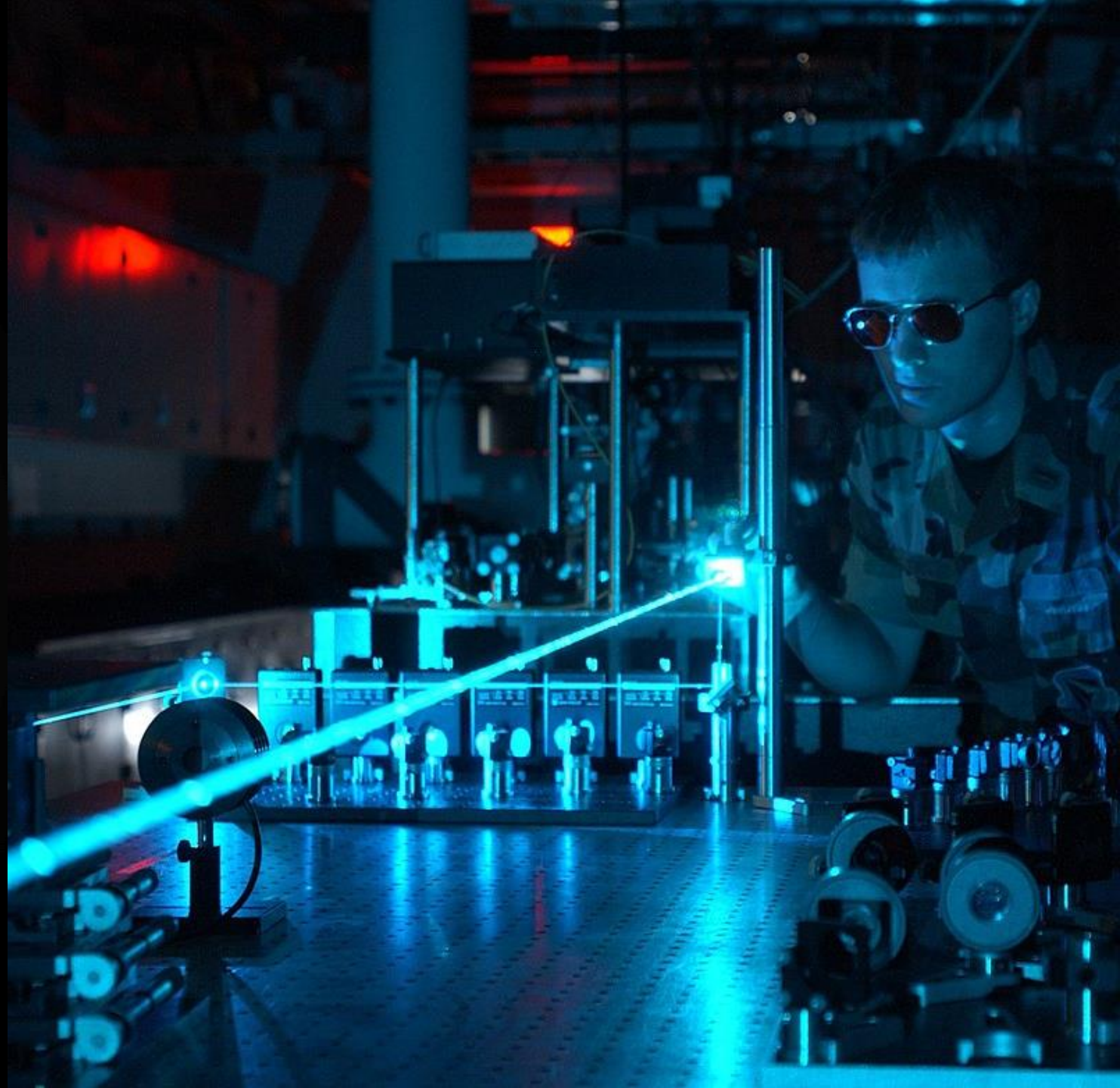


DOMINIKA BŘEZINOVÁ:
STUDENTSKÝ PROJEKT NA MFF UK

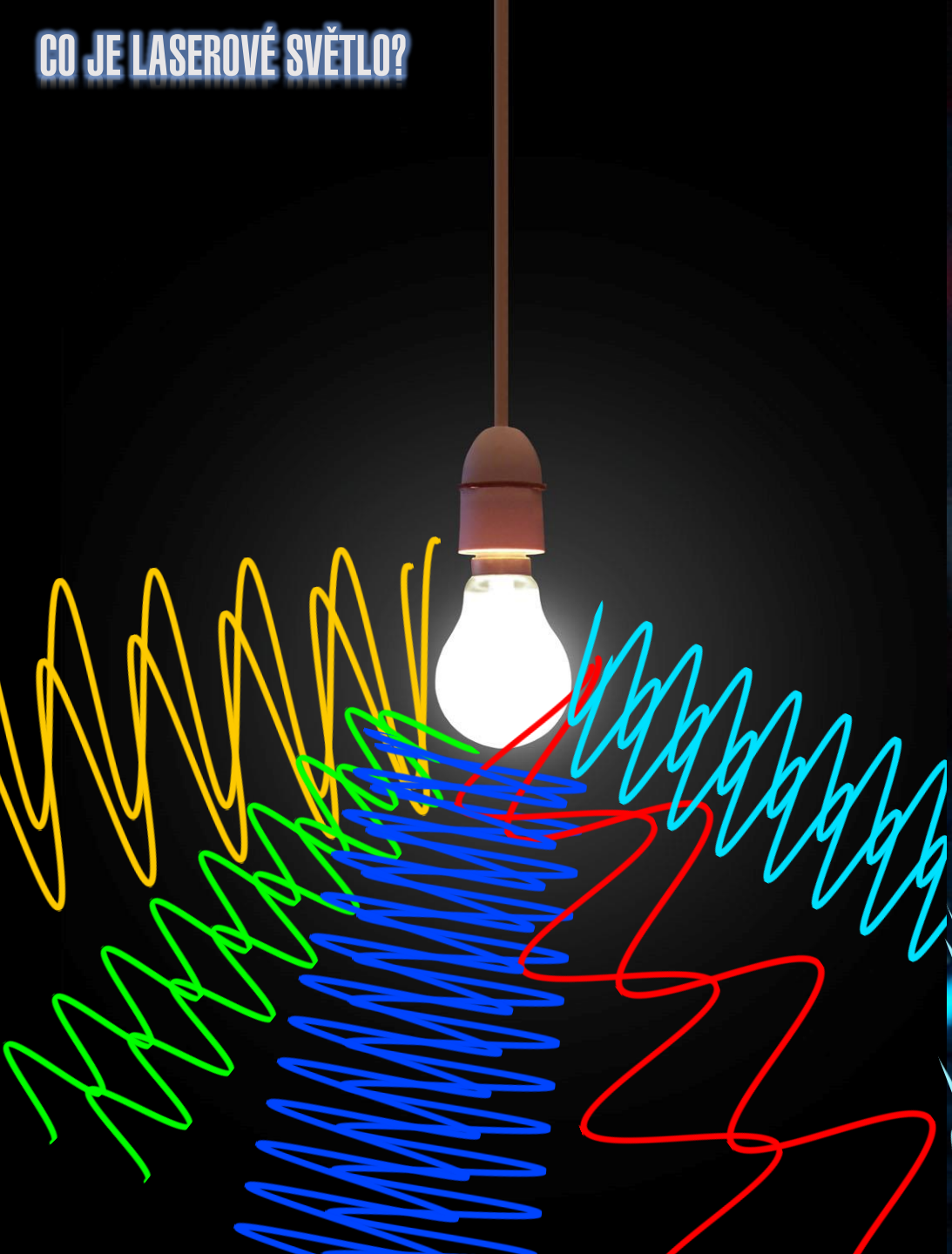
LASER JE KOHERENTNÍ

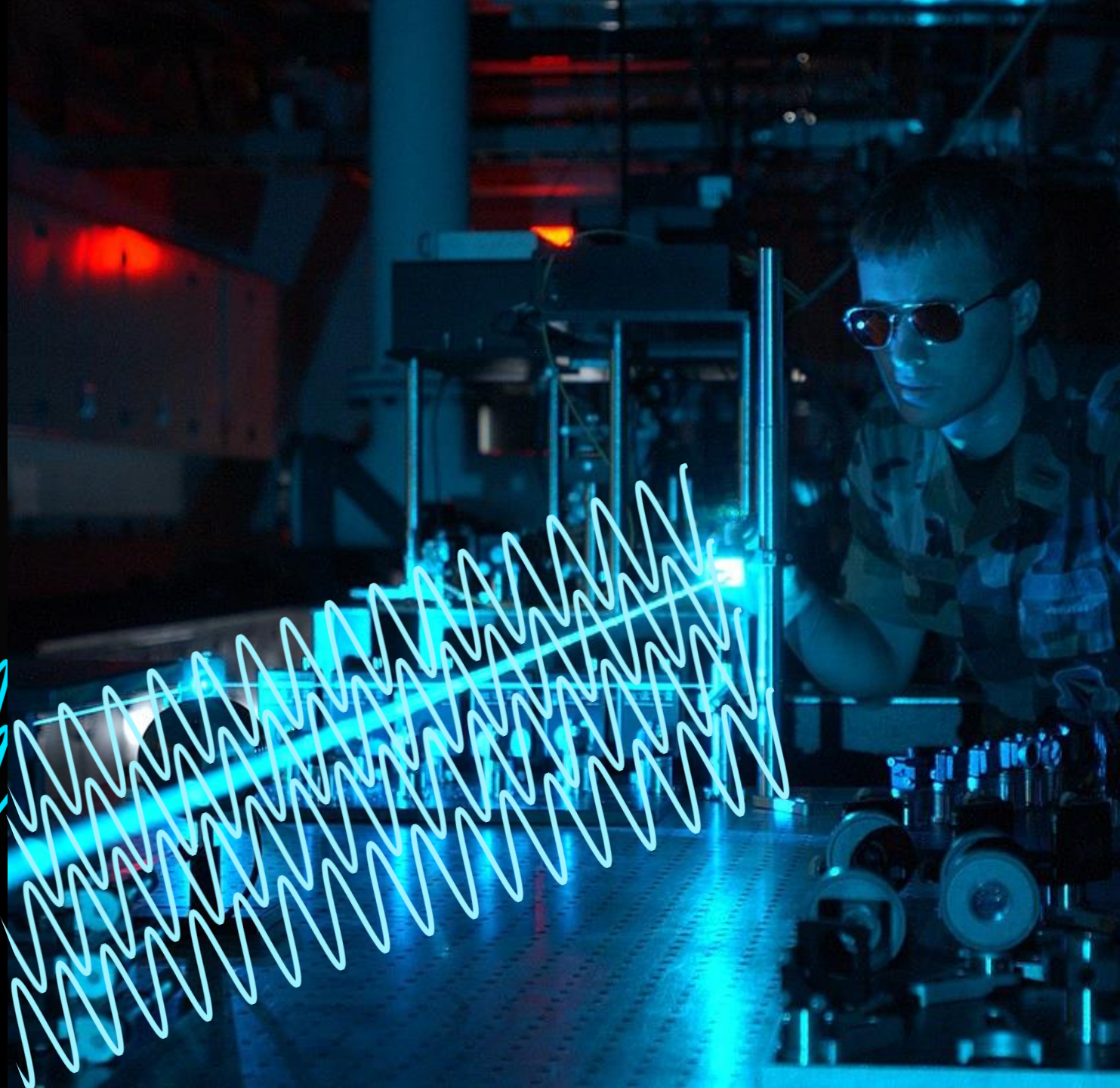
DAN SMALLEY, BRIGHAM YOUNG UNIVERSITY

CO JE LASEROVÉ SVĚTLO?

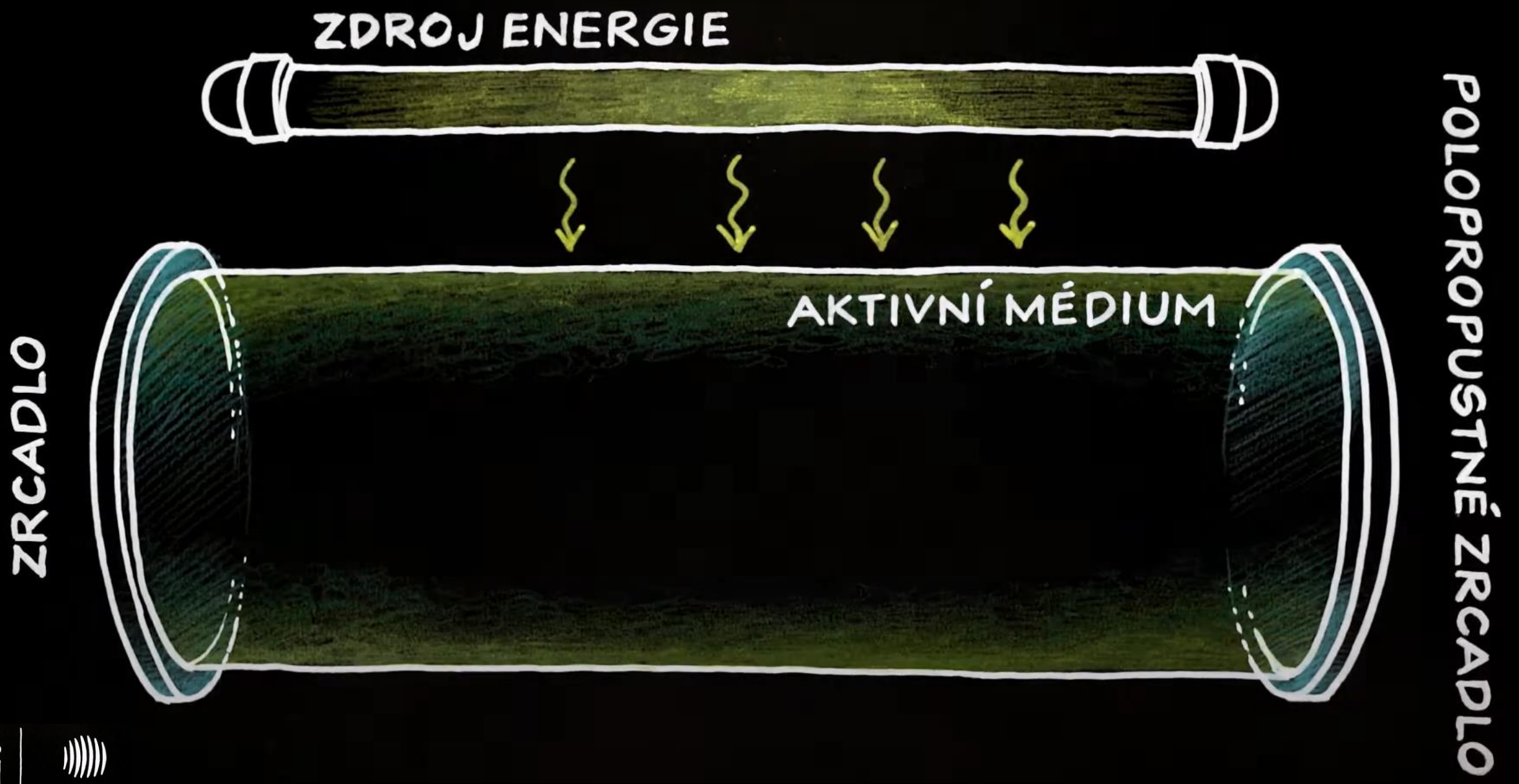


CO JE LASEROVÉ SVĚTLO?



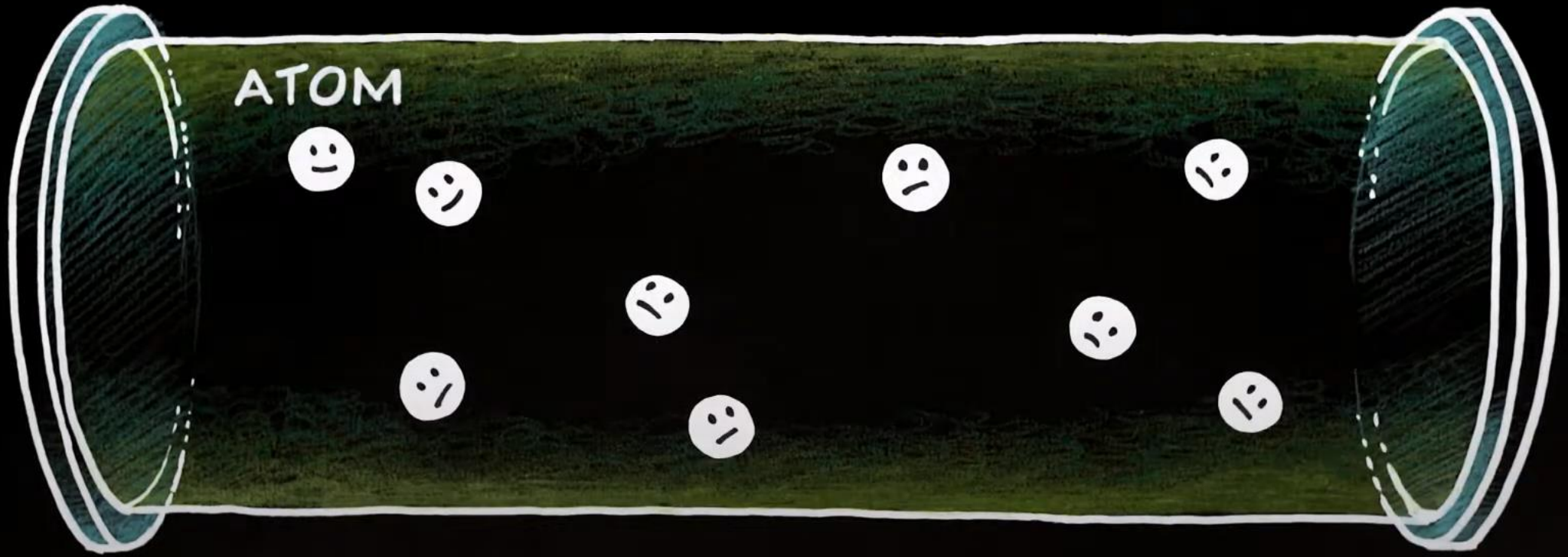


JAK VYROBIT LASER?



eli beamlines

JAK VYROBIT LASER?



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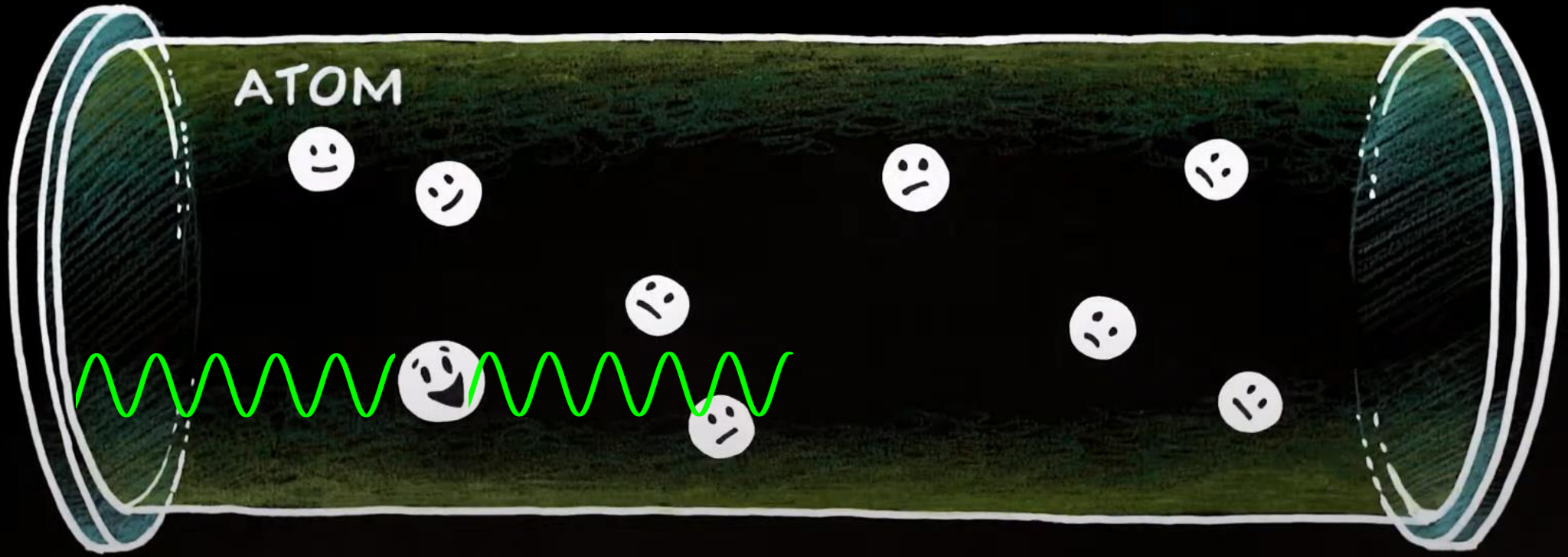
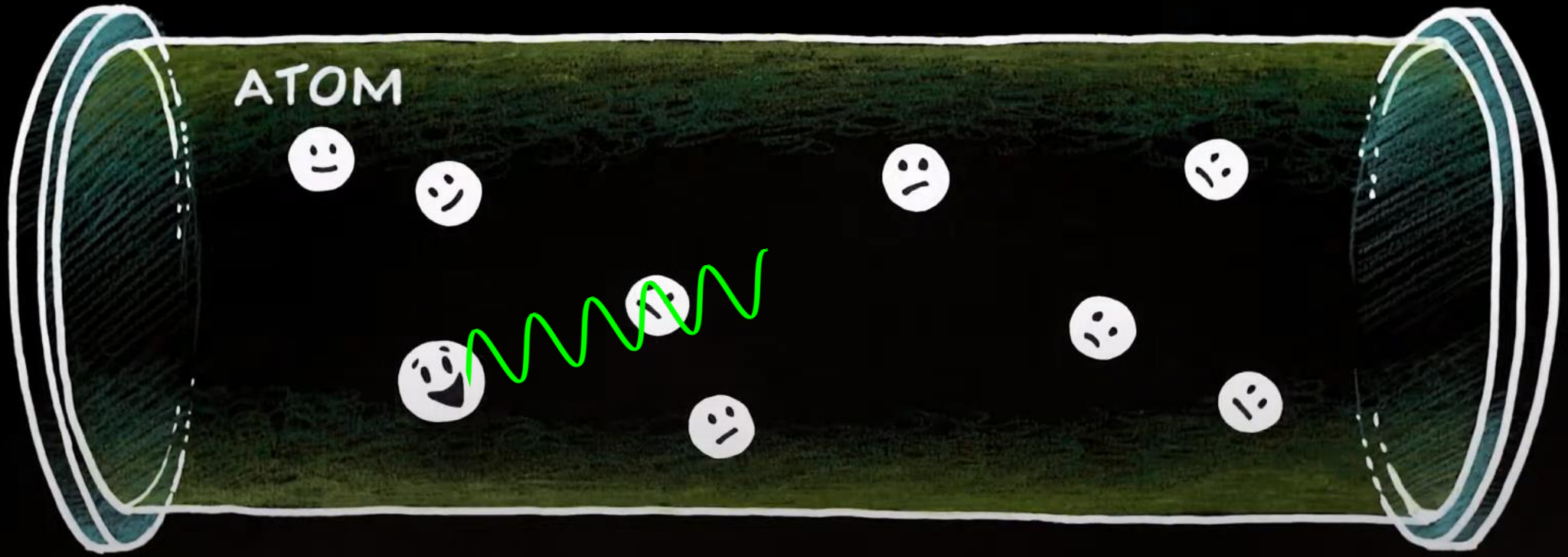


eli beamlines

JAK VYROBIT LASER?



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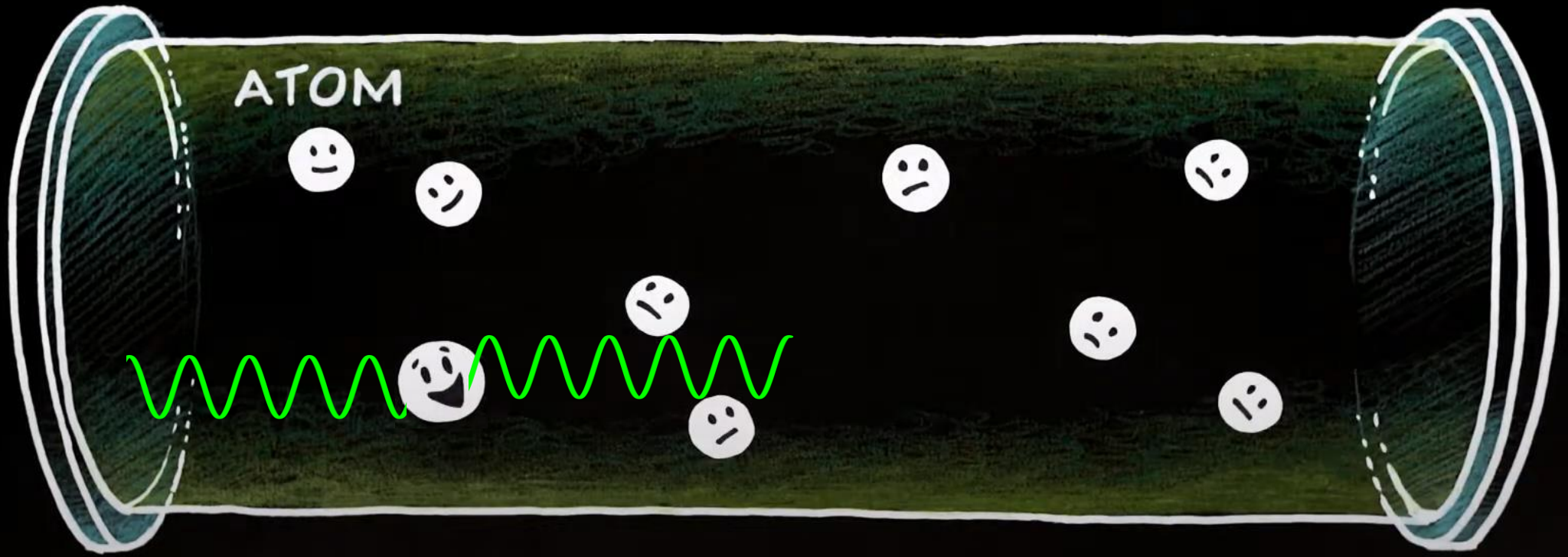

eli beamlines

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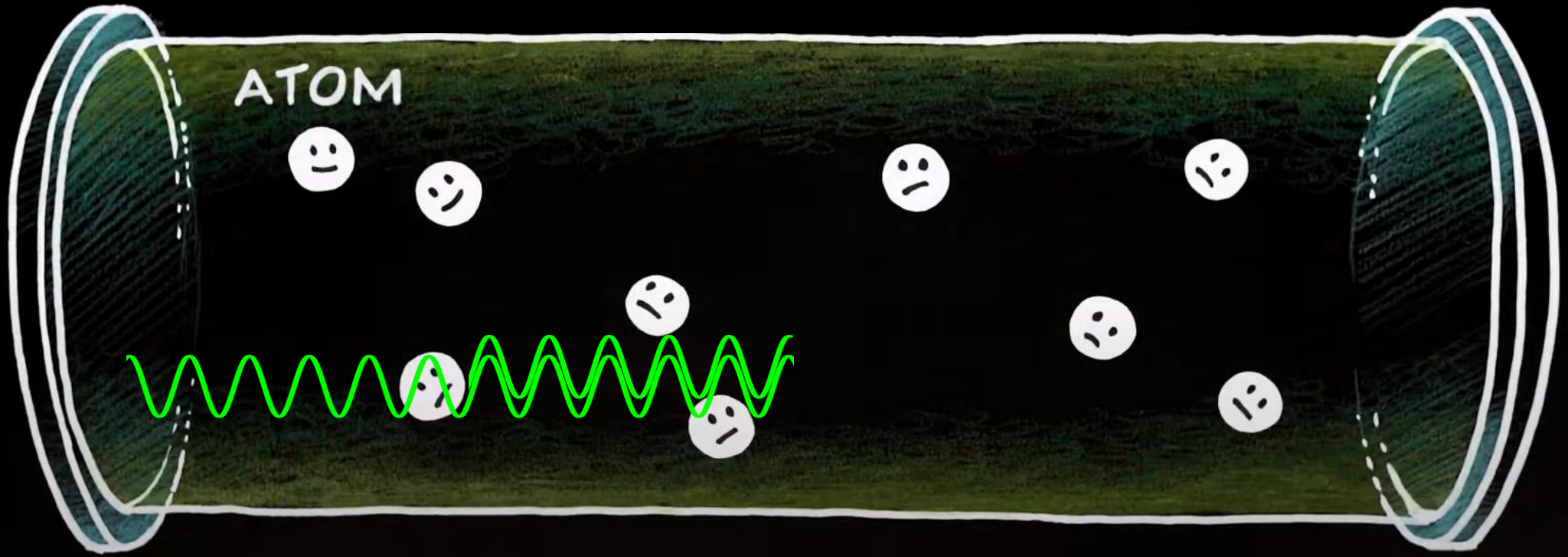
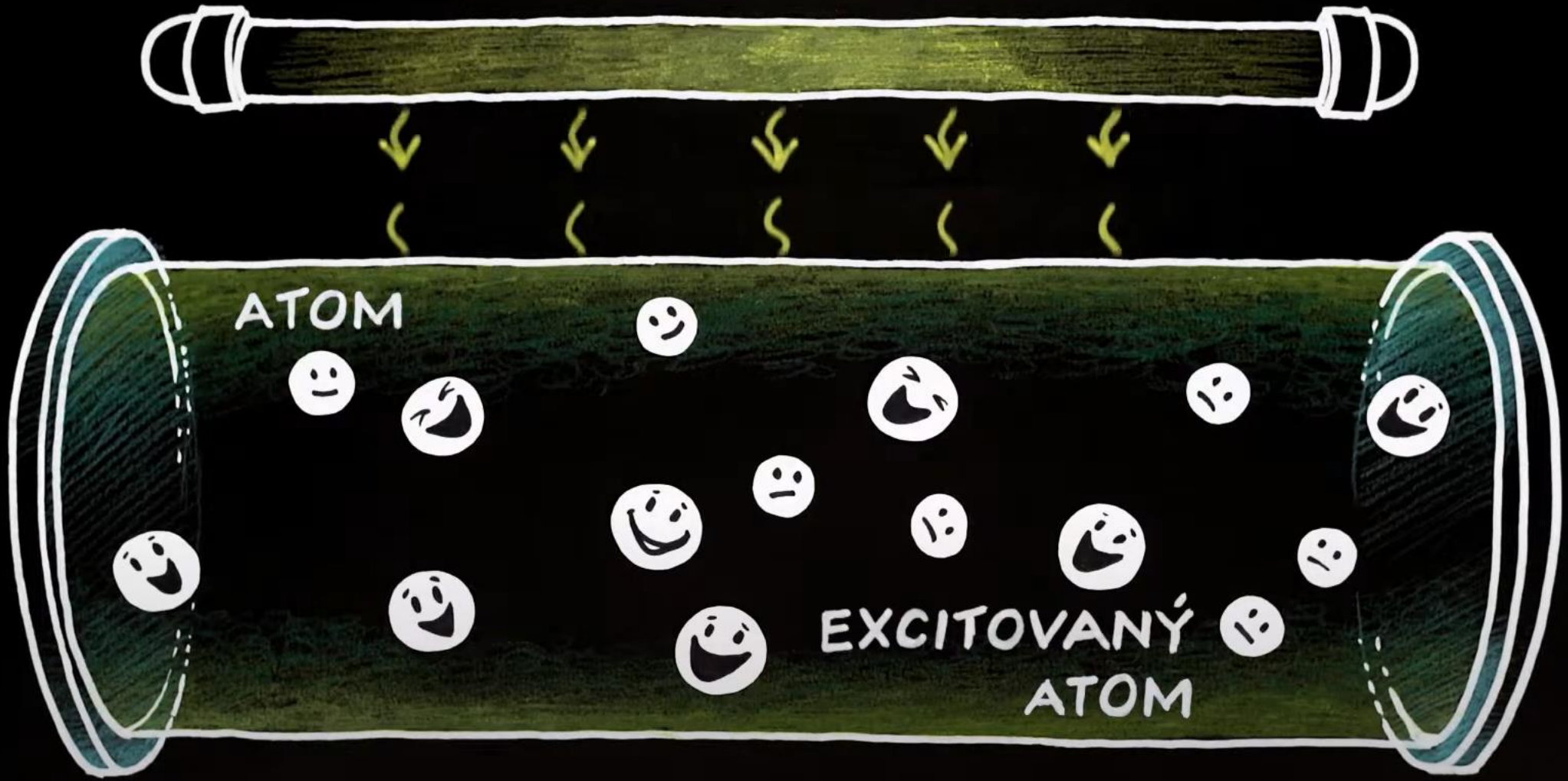
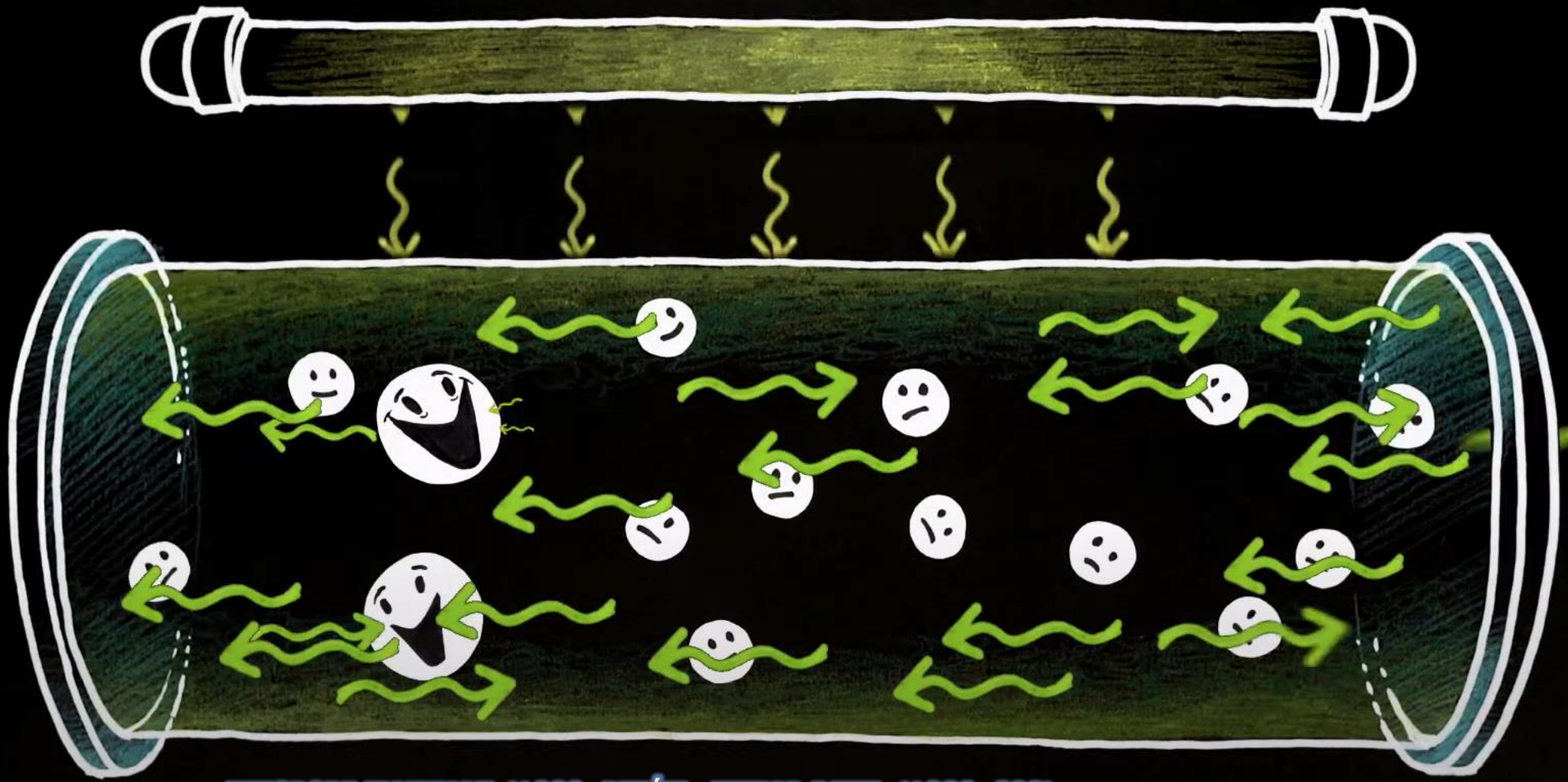


eli beamlines

JAK VYROBIT LASER?



JAK VYROBIT LASER?



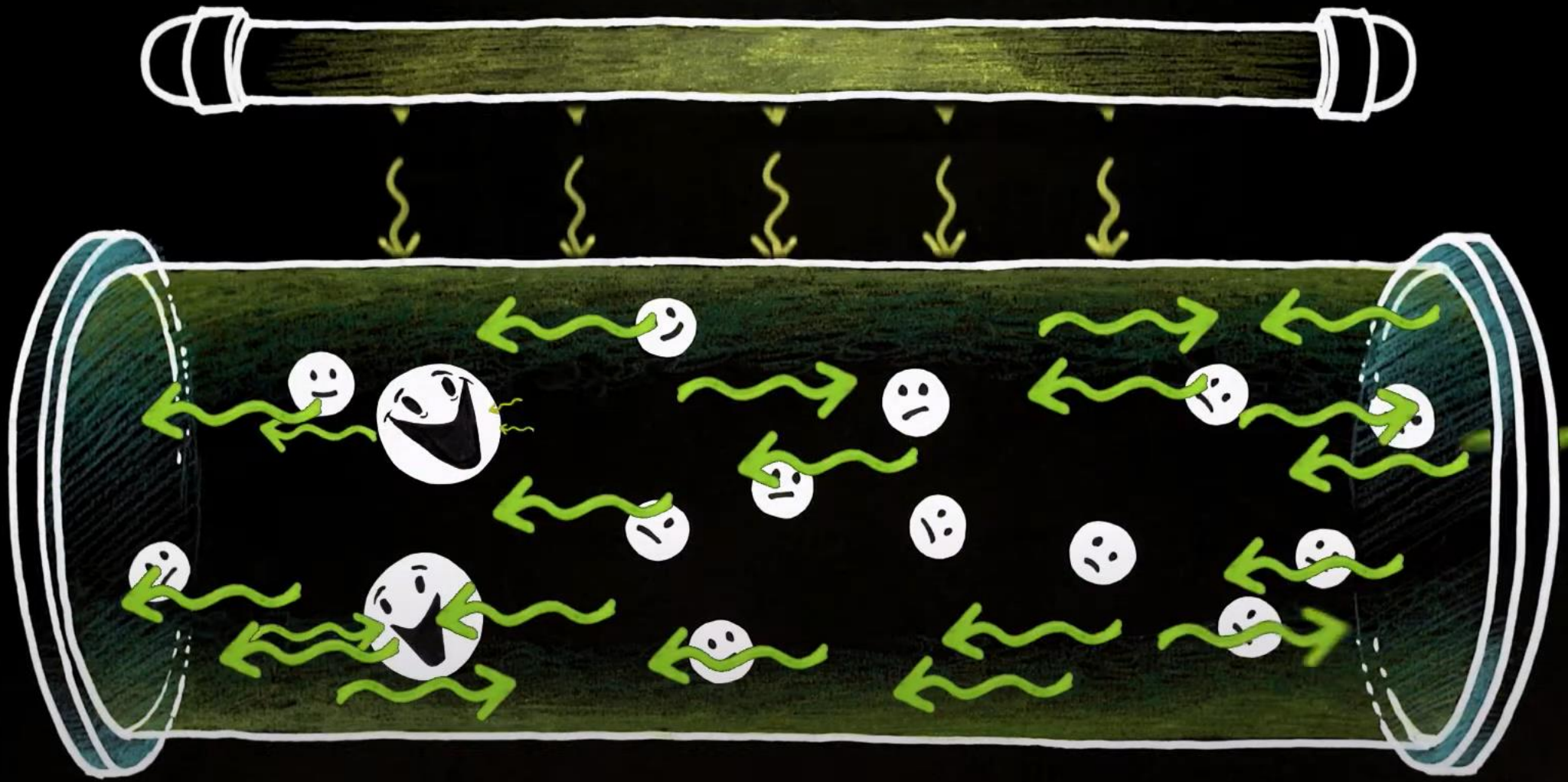
THEODORE MAINMAN (1960, RUBÍN), KUMAR PATEL (1963, CO2),
NOBELOVA CENA (1964): CHARLES TOWNES, NIKOLAJ BASOV, ALEXANDR PROCHOROV

eli beamlines

JAK VYROBIT LASER?

LASER = Light Amplification by Stimulated Emission of Radiation

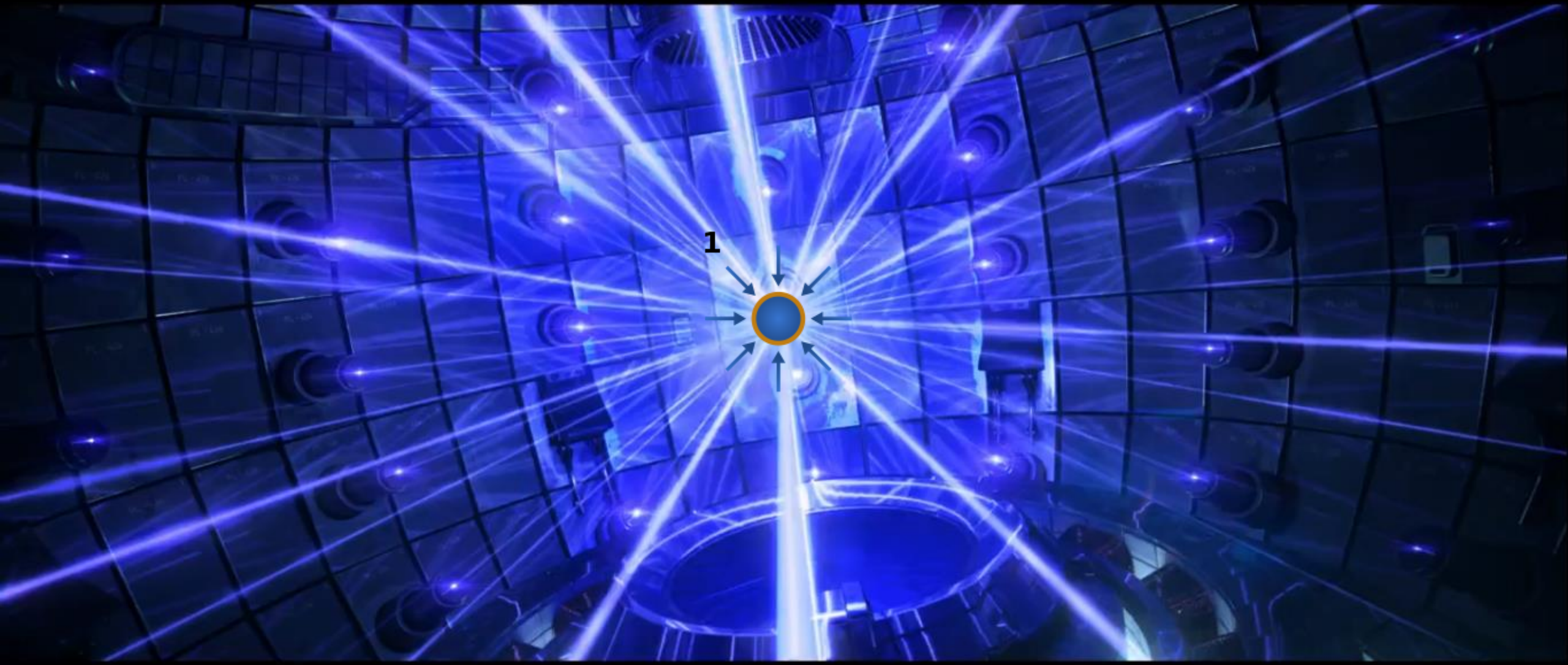
LOSER = Oscillation



eli beamlines

„STVOŘTE SLUNCE A BUDETE JAKO BOHOVÉ."

NATIONAL IGNITION FACILITY, CALIFORNIA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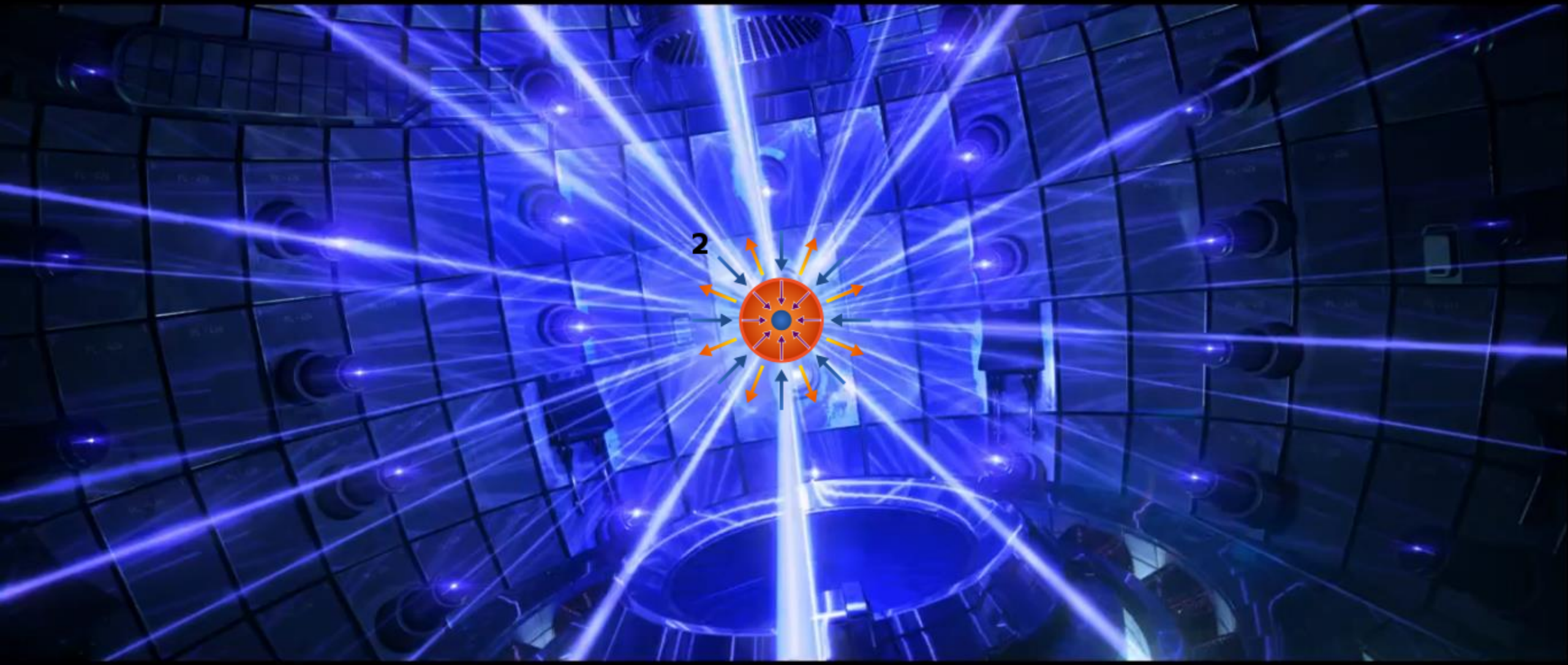
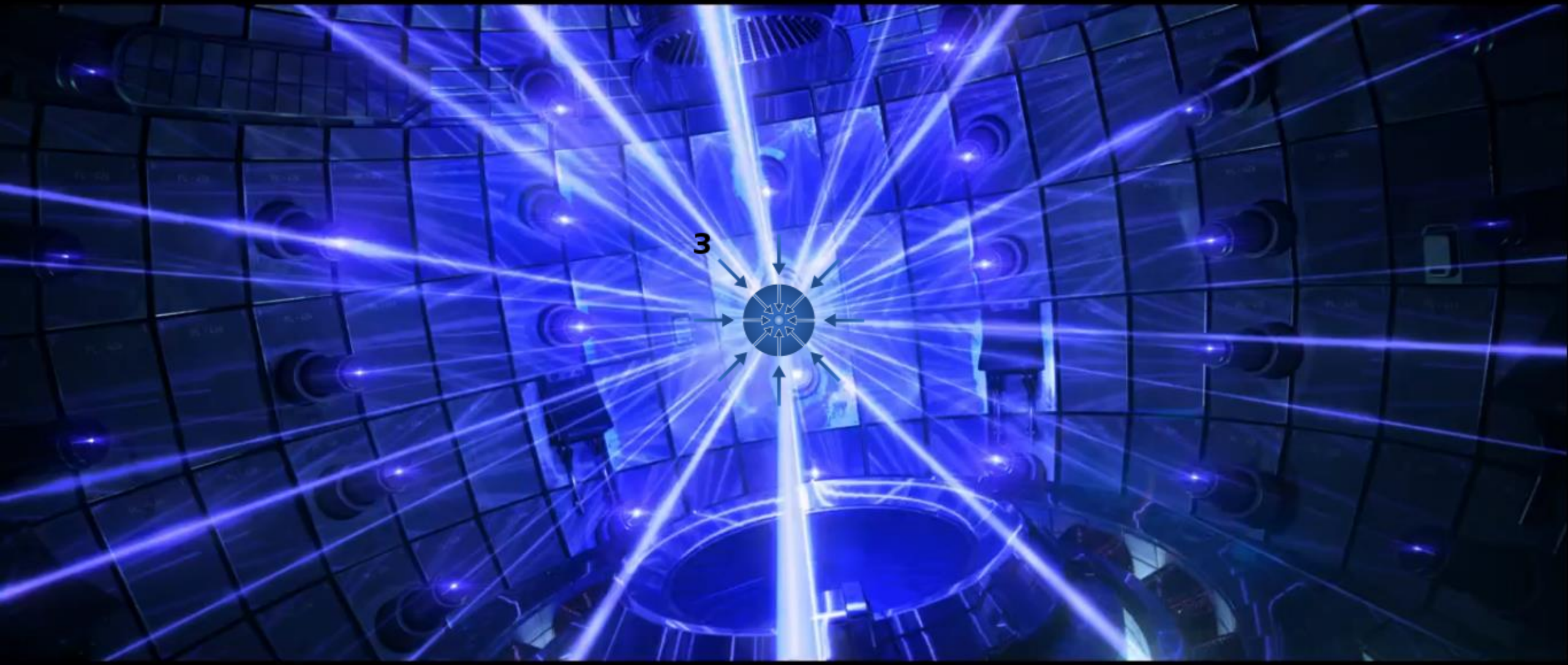


ROSINANTE, THE EXPANSE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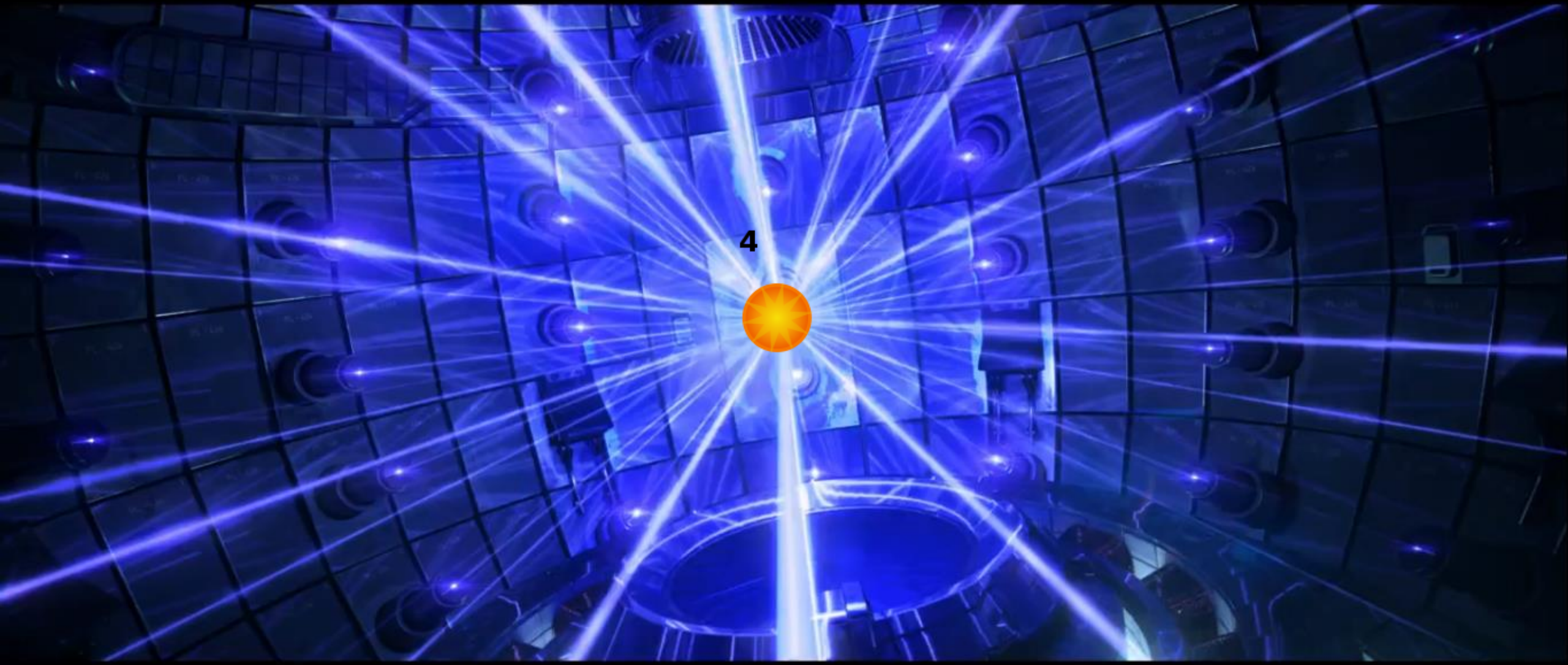
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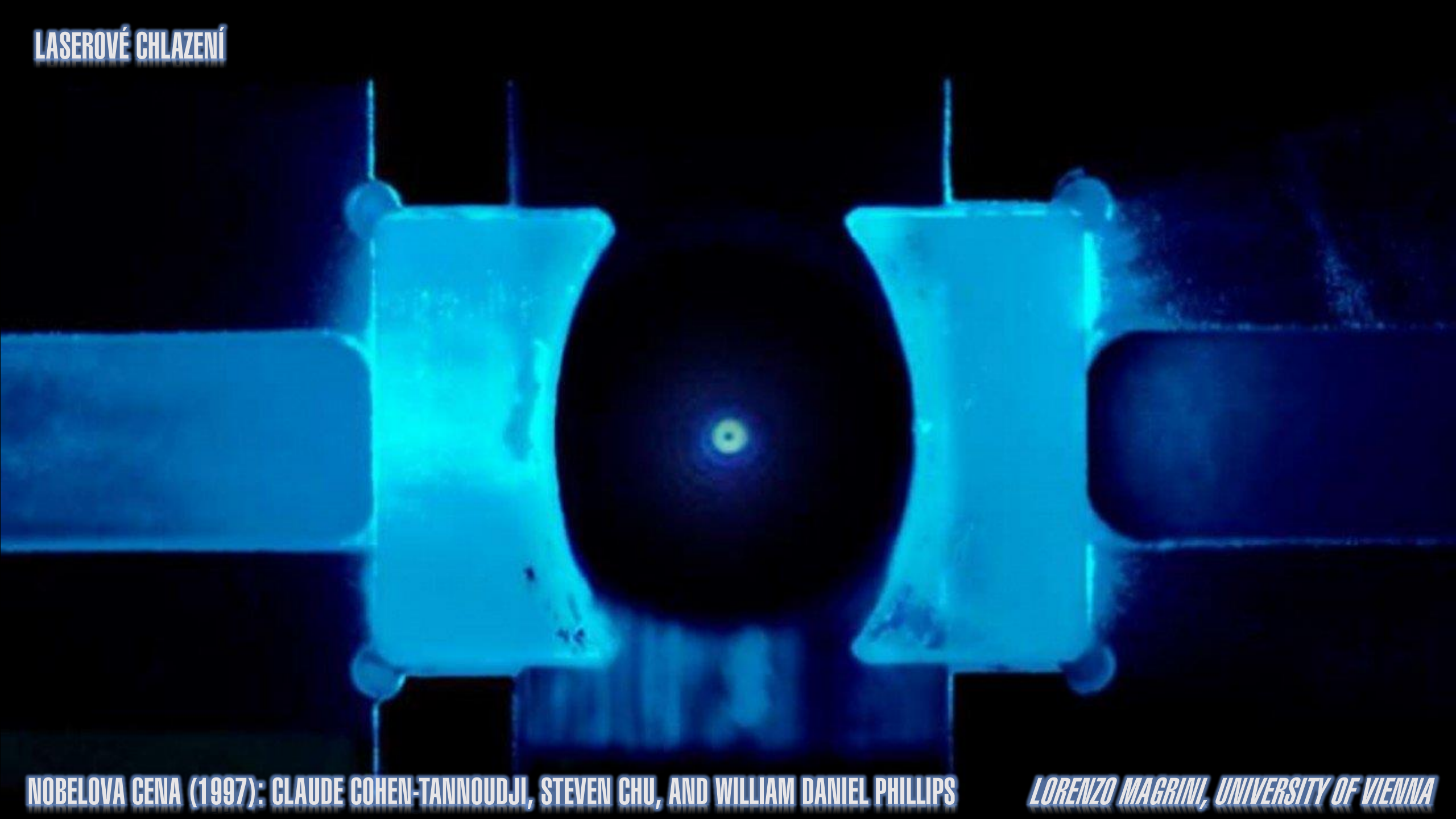
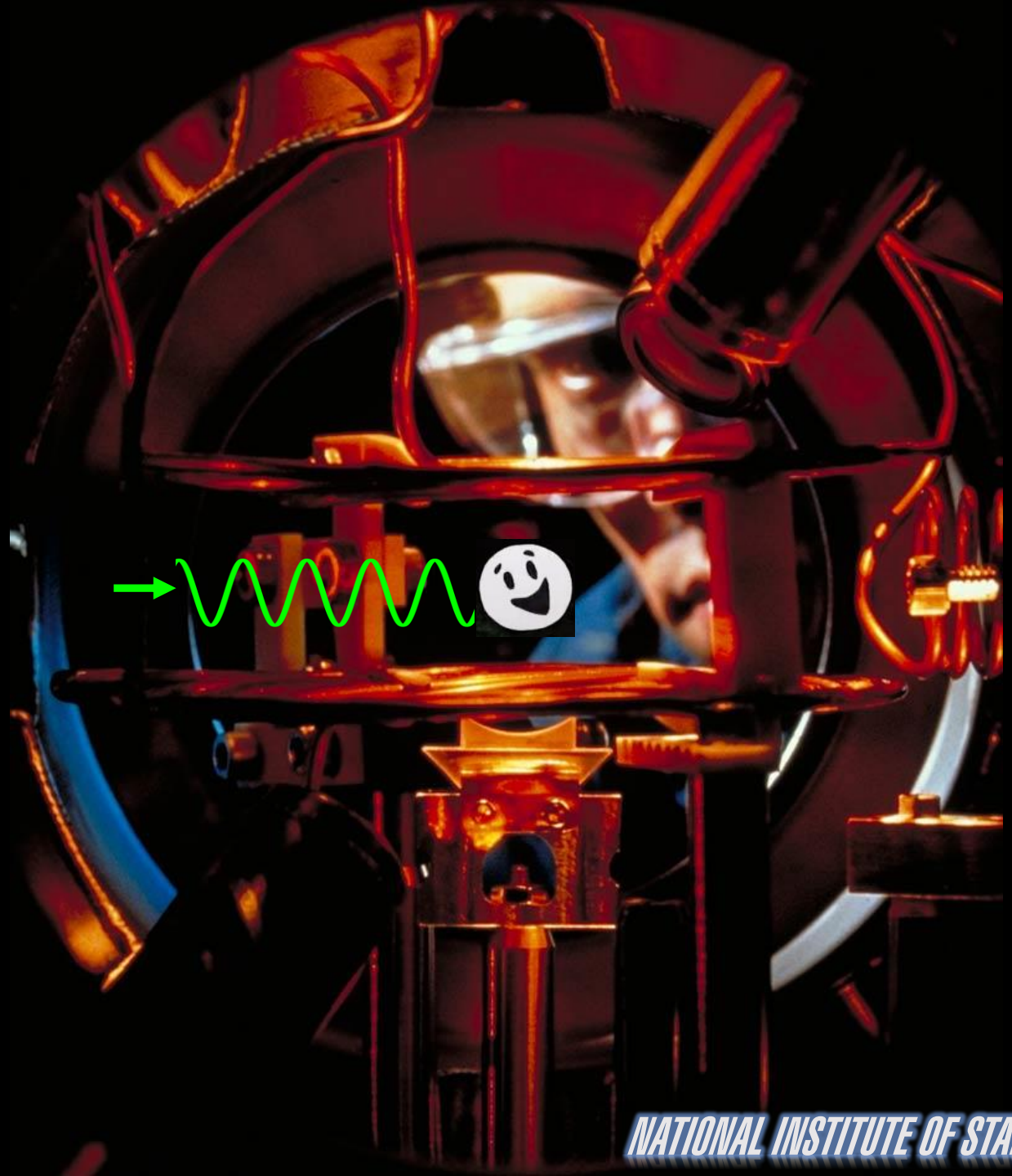
LASEROVÉ CHLAZENÍ



NOBELOVA CENA (1997): CLAUDE COHEN-TANNOUDJI, STEVEN CHU, AND WILLIAM DANIEL PHILLIPS

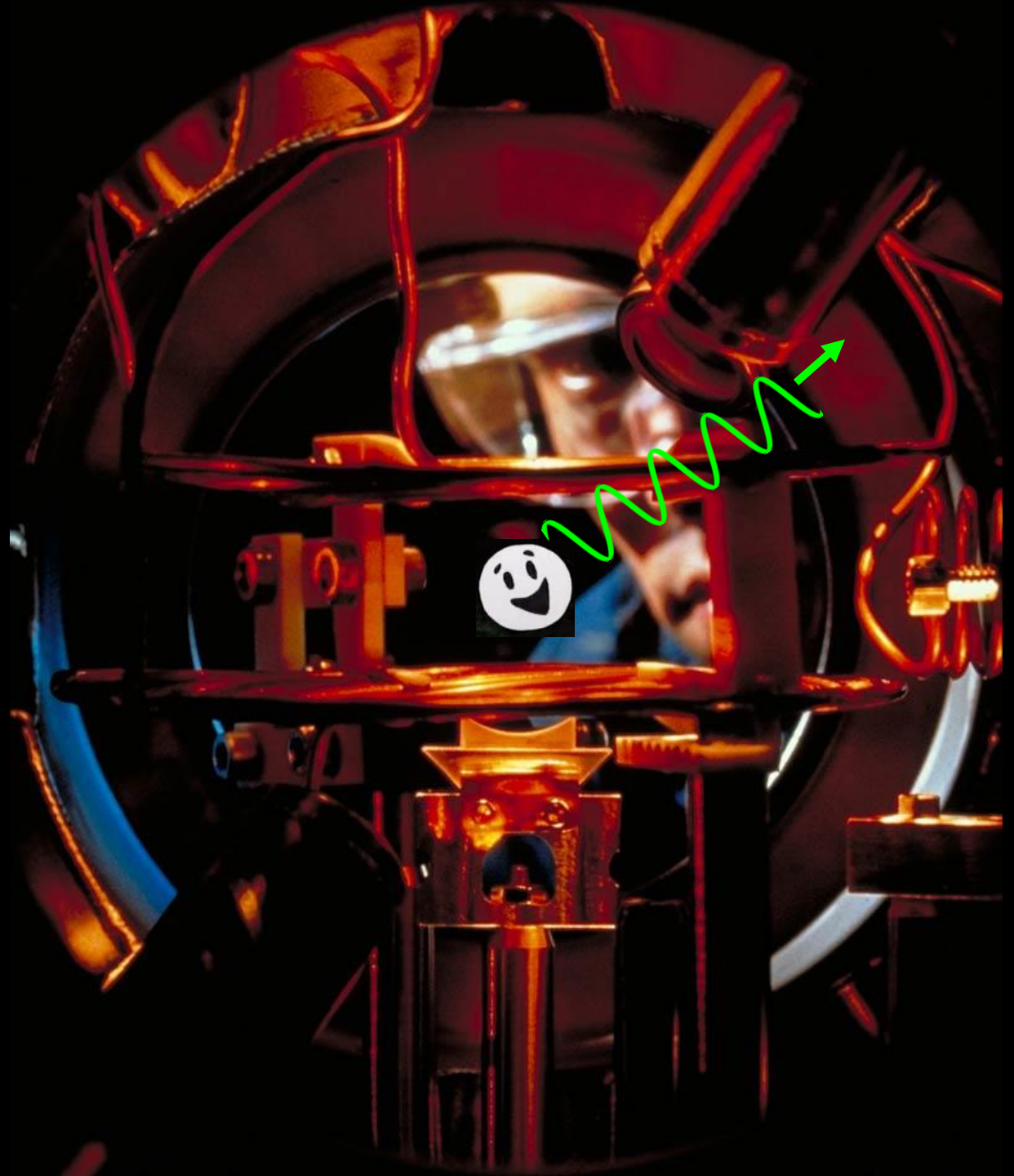
LORENZO MAGRINI, UNIVERSITY OF VIENNA

LASEROVÉ CHLAZENÍ



NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY, COLORADO

LASEROVÉ CHLAZENÍ



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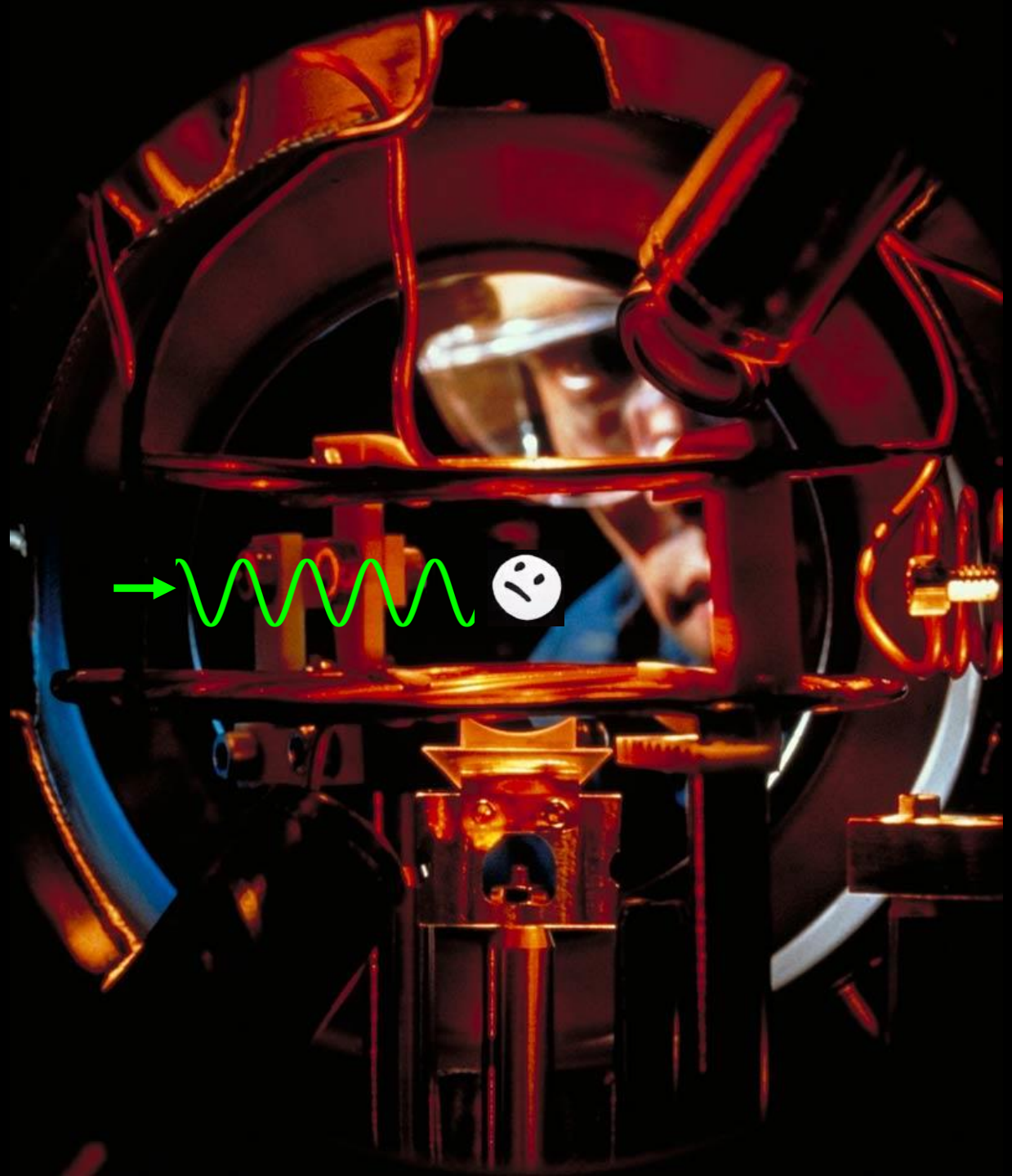

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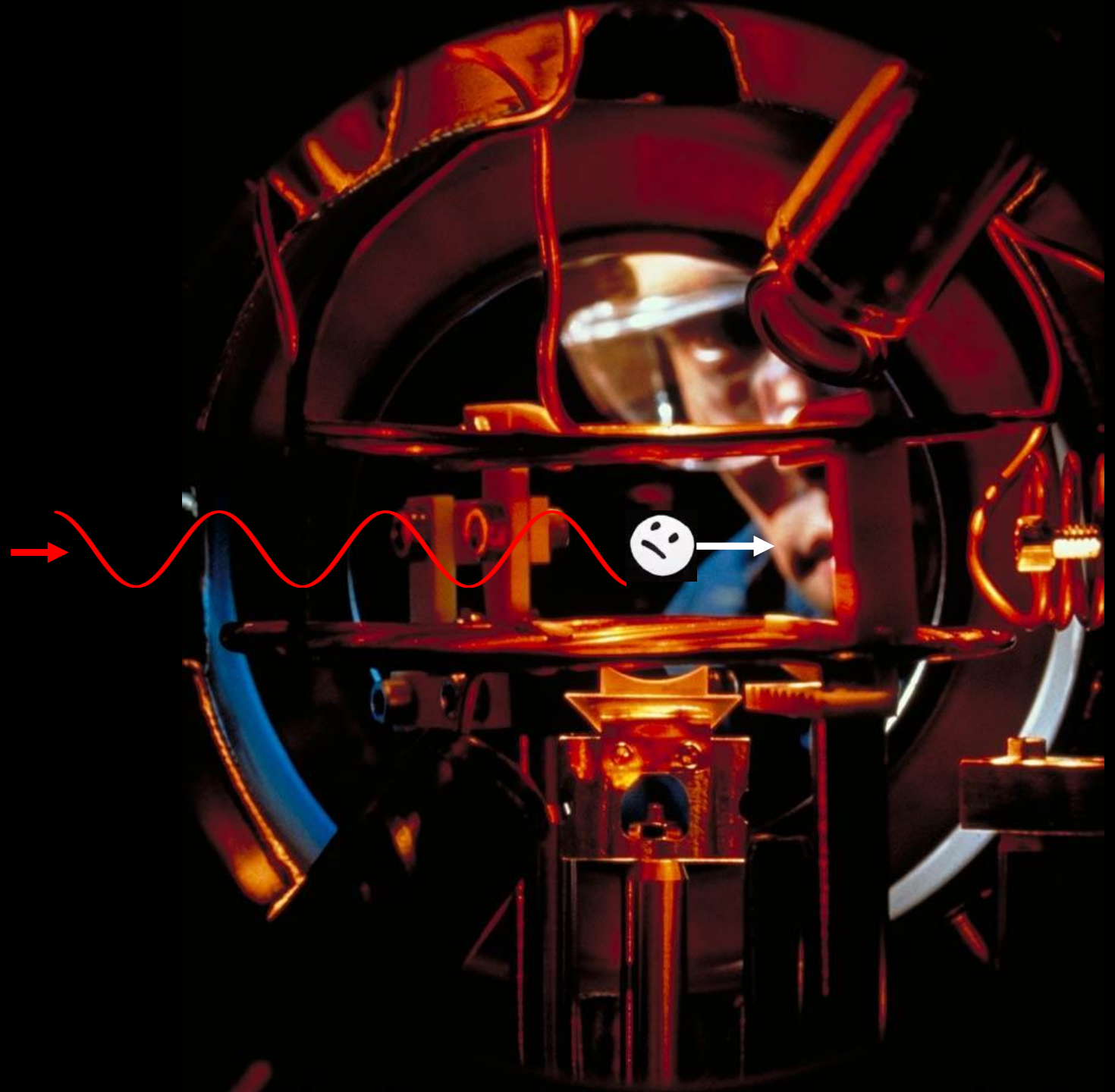

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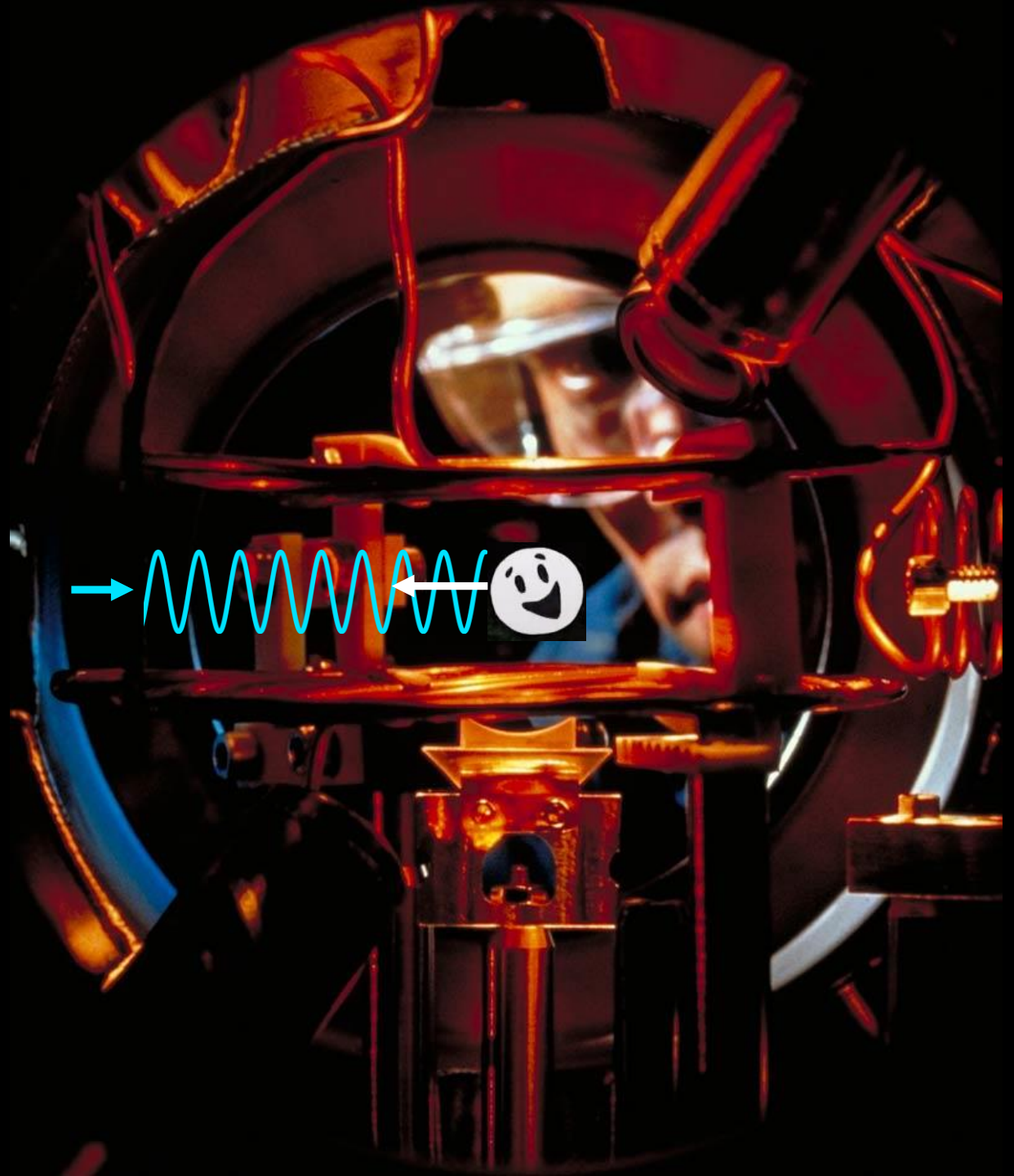
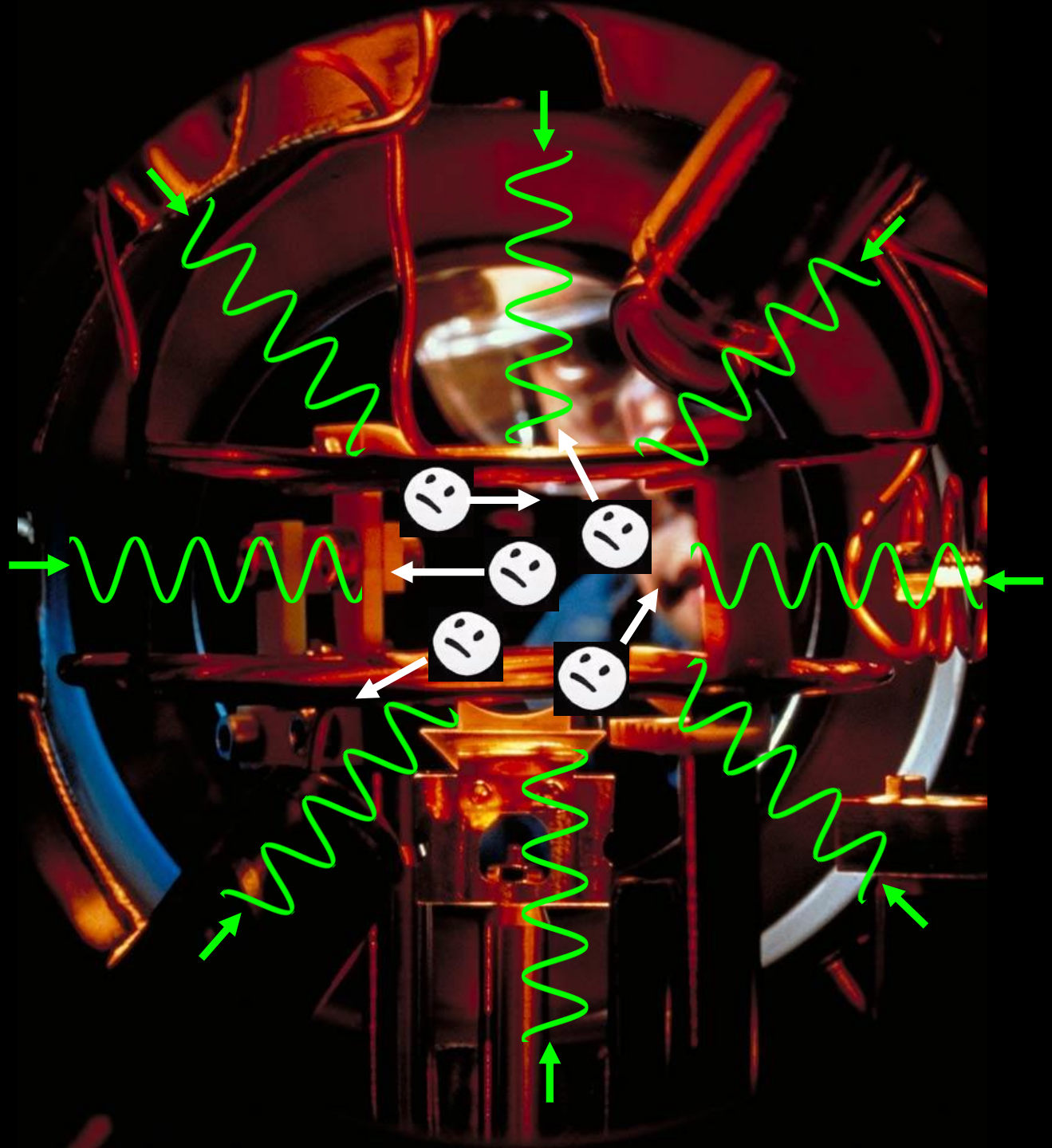
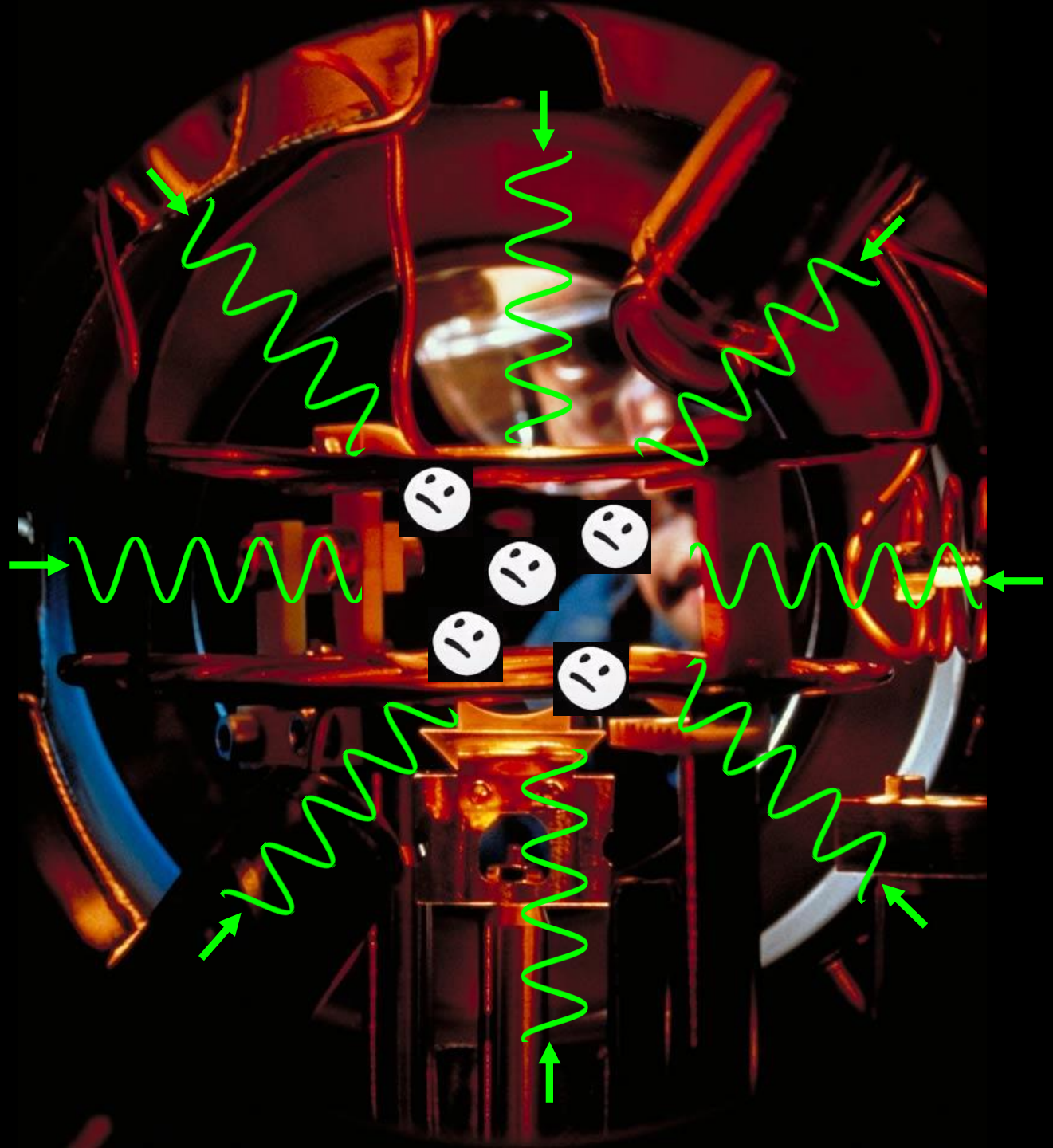
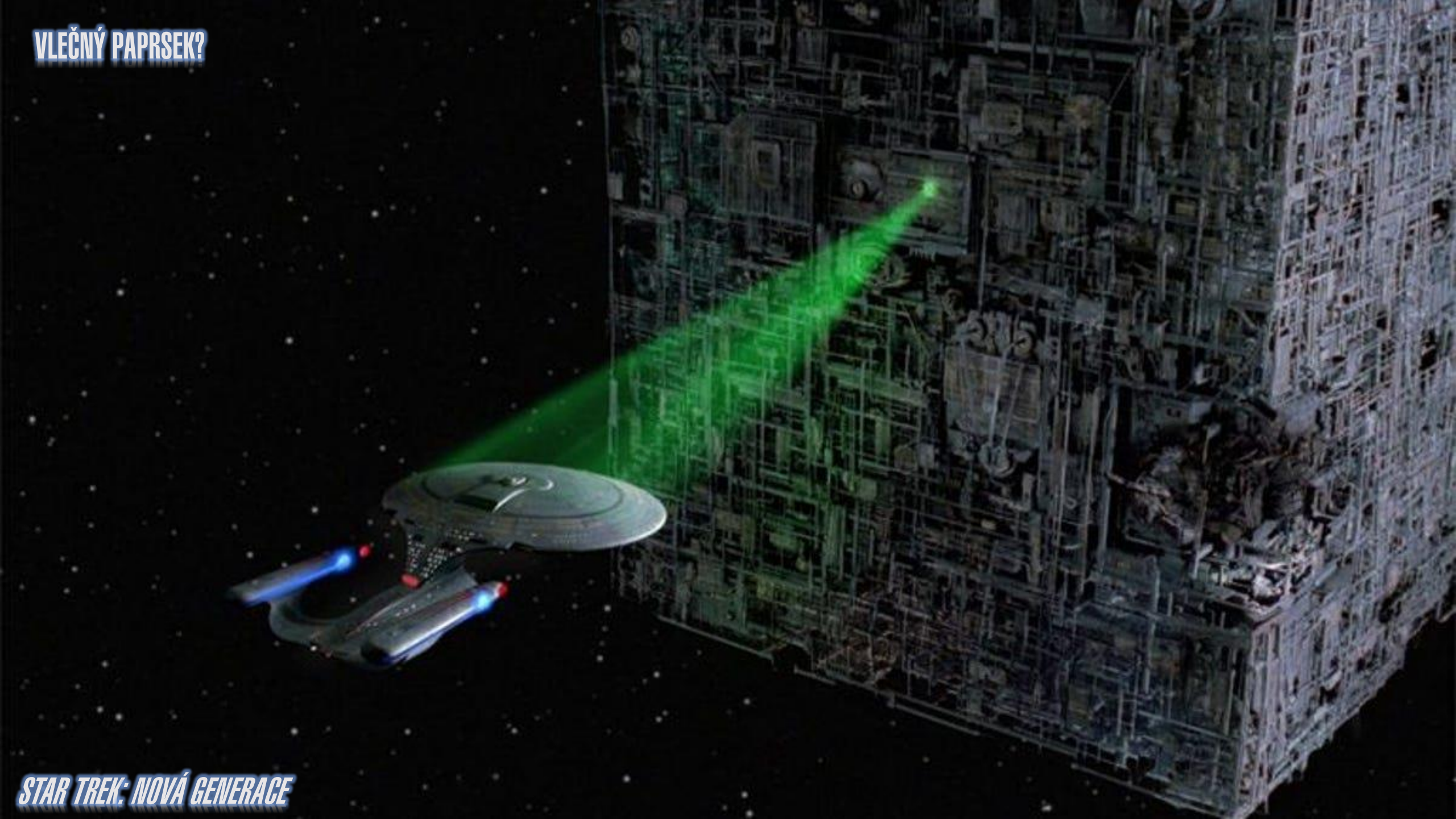


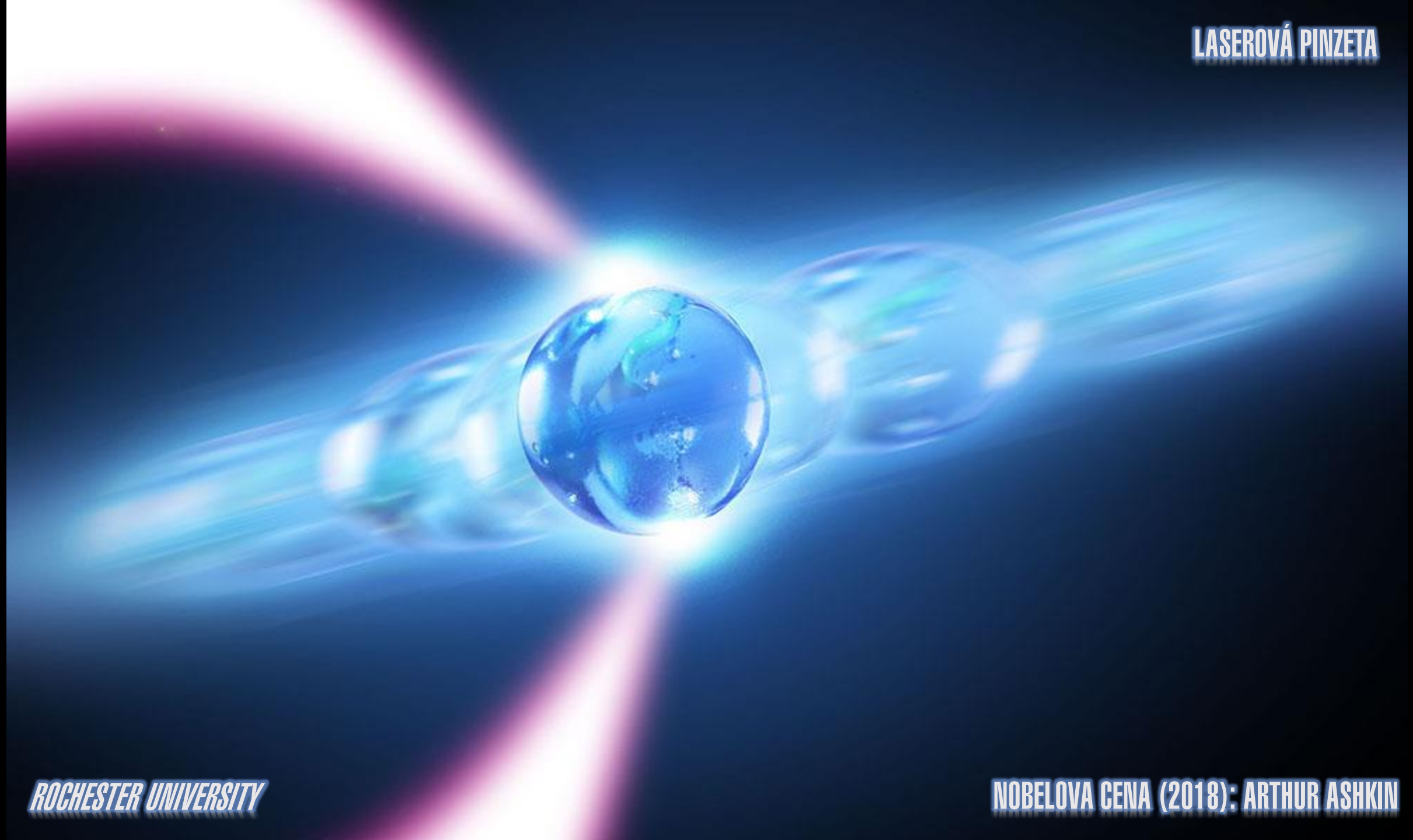
LASEROVÉ CHLAZENÍ

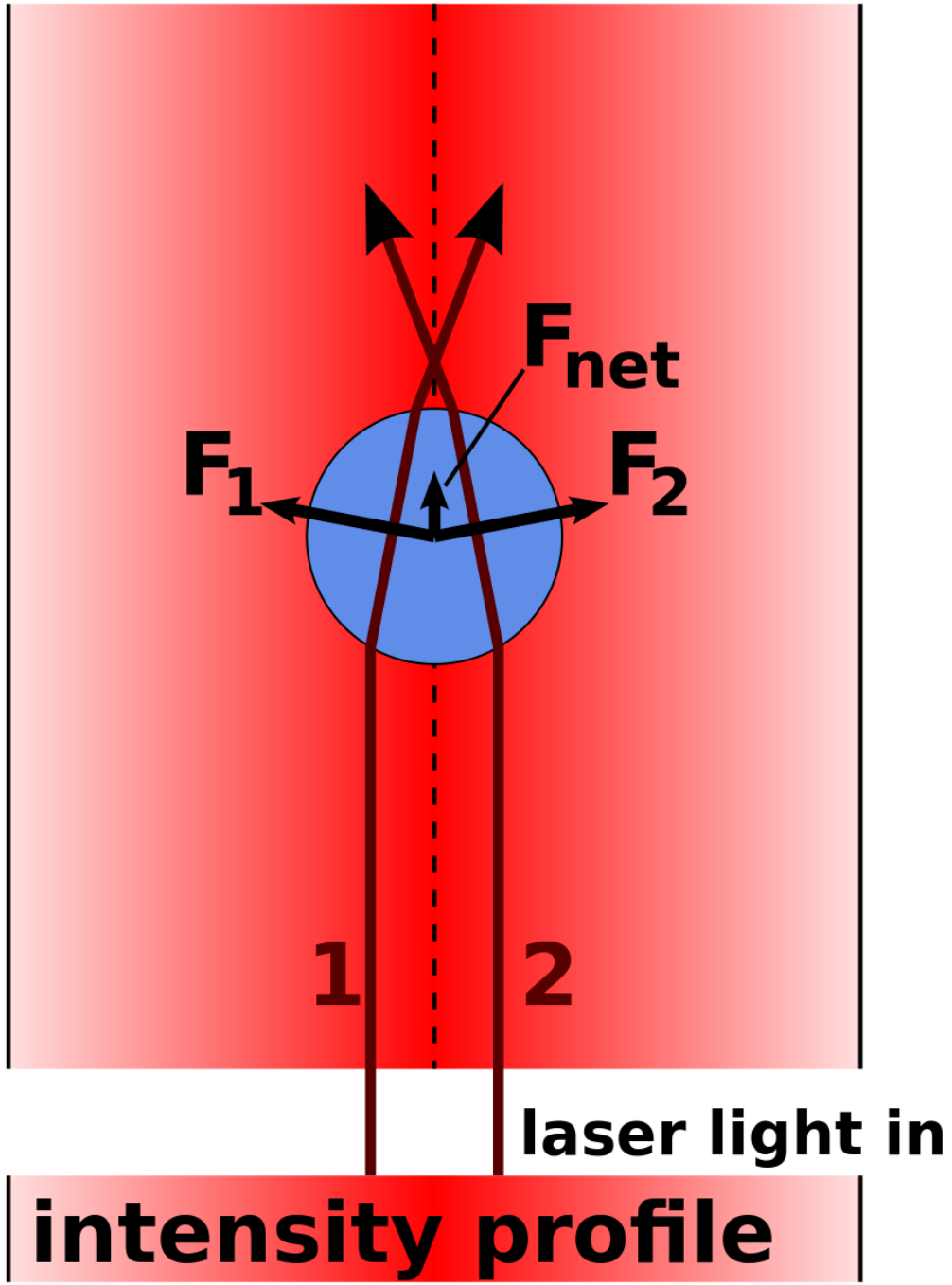


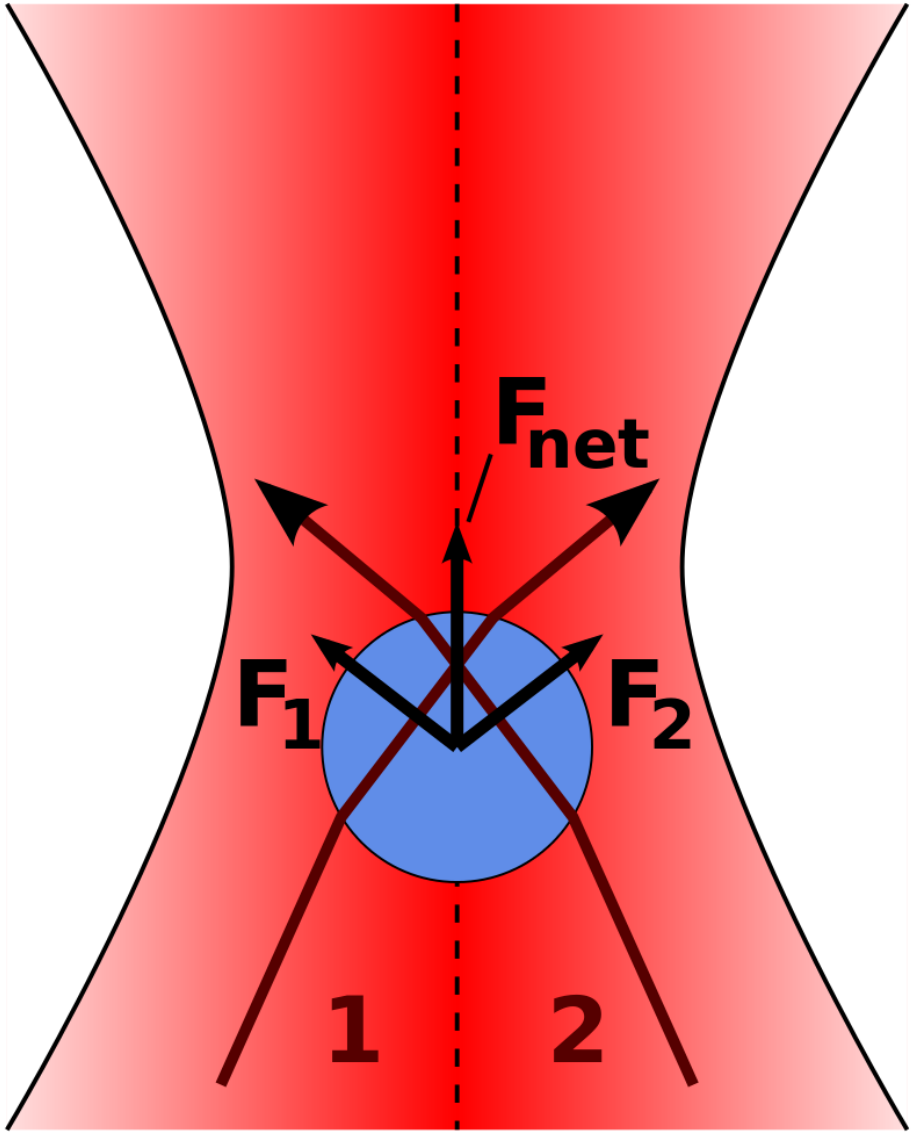
LASEROVÉ CHLAZENÍ




VLEČNÝ PAPRSEK?
STAR TREK: NOVÁ GENERACE

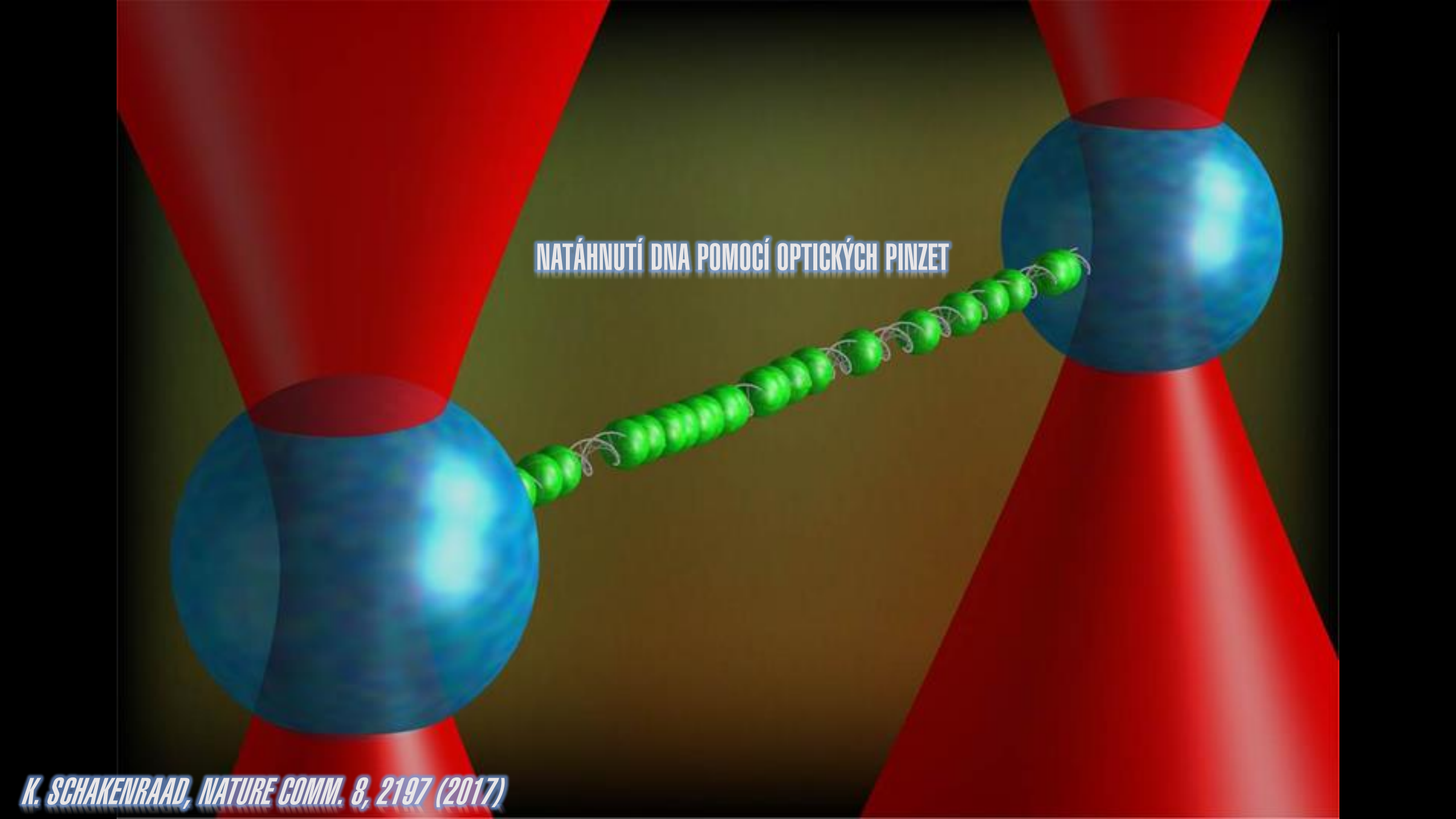

LASEROVÁ PINZETA
ROCHESTER UNIVERSITY
NOBELOVA CENA (2018): ARTHUR ASHKIN


F_{net}
F_1
F_2
1
2
laser light in
intensity profile



laser light in

intensity profile



K. SCHAKENRAAD, NATURE COMM. 8, 2197 (2017)

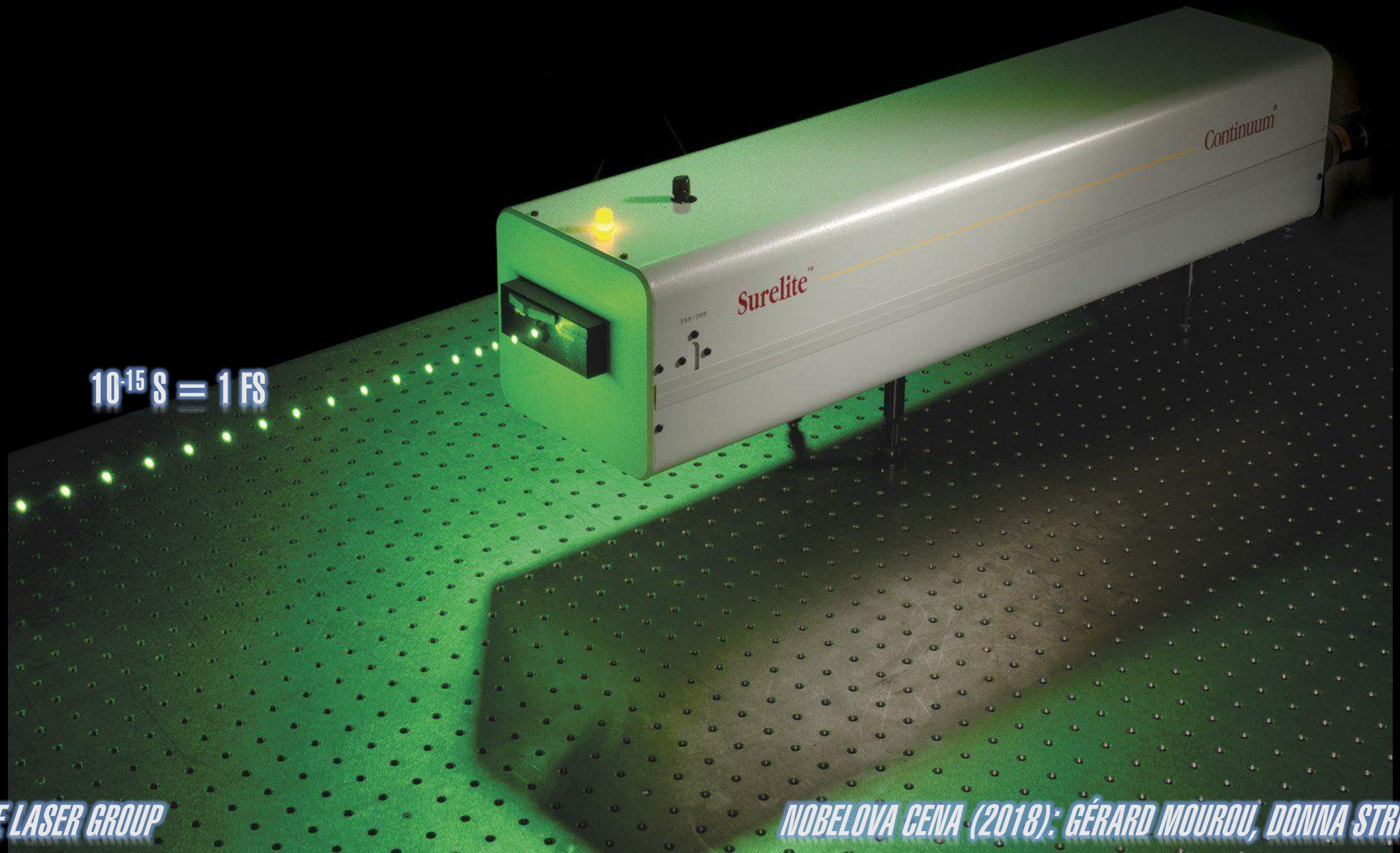
PULZNÍ PHASERY/LASERY
(ROKY 2380)

KONTINUÁLNÍ PHASERY/LASERY
(ROKY 2360-2370)

STAR TREK: NOVÁ GENERACE

STAR TREK: HLUBOKÝ VESMÍR 9

ULTRARYCHLÉ FEMTOSEKUNDOVÉ LASERY

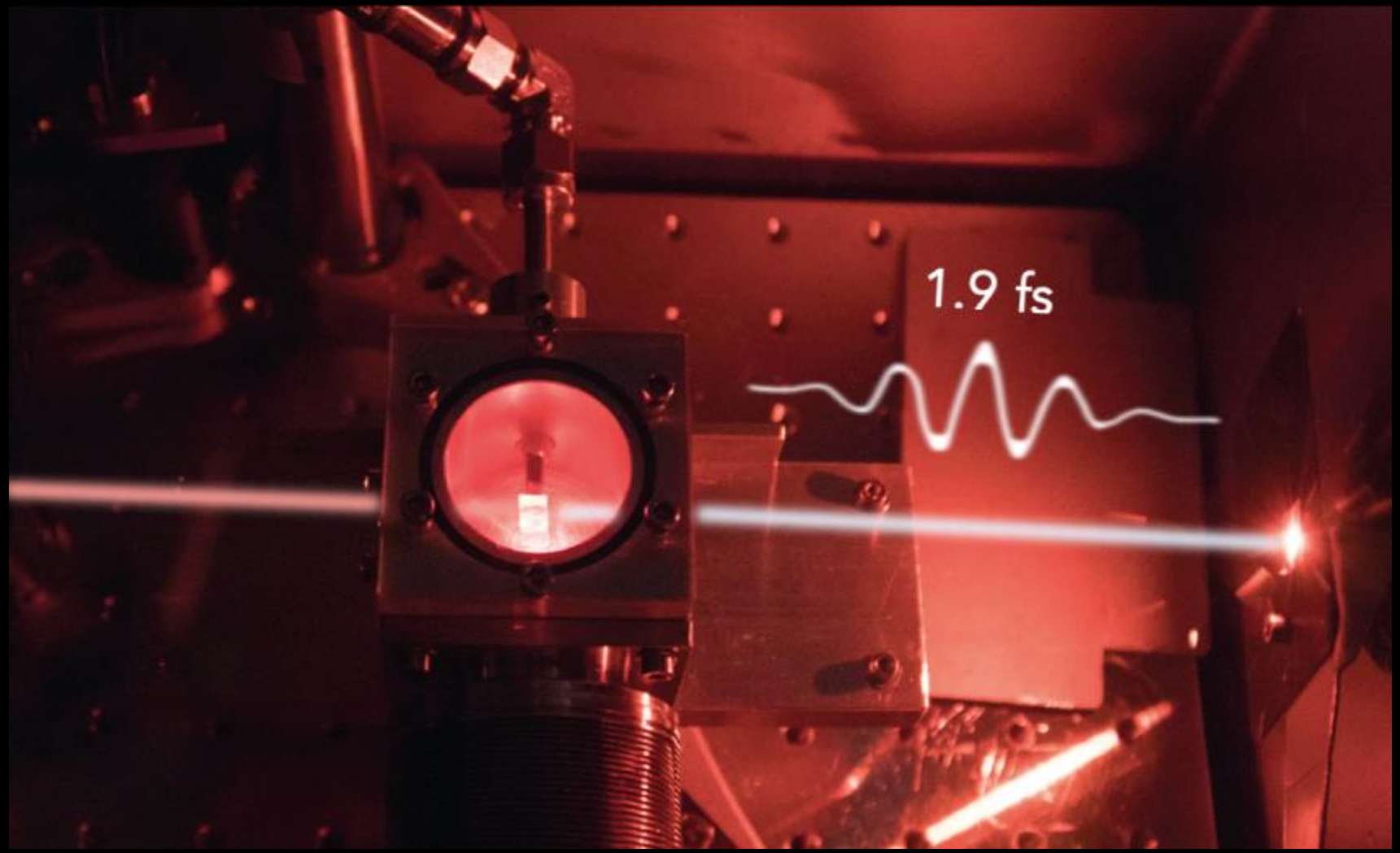


10^{-15} S = 1 FS

AMPLITUDE LASER GROUP

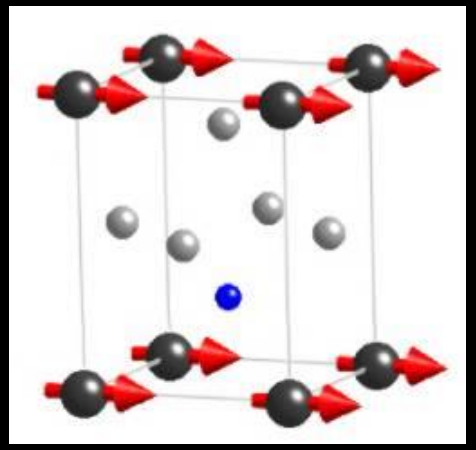
NOBELOVA CENA (2018): GÉRARD MOUROU, DONNA STRICKLAND

ULTRARYCHLÉ FEMTOSEKUNDOVÉ LASERY

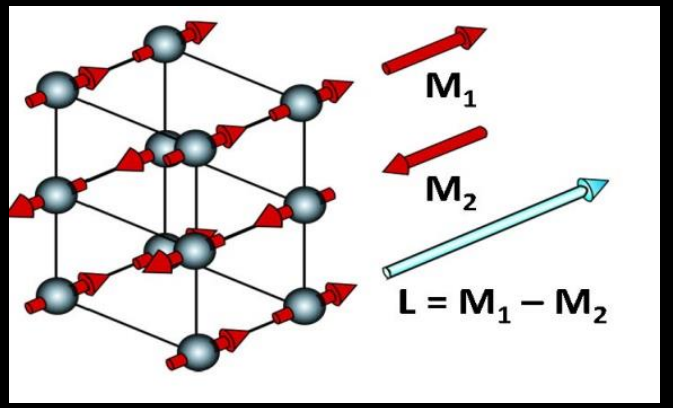


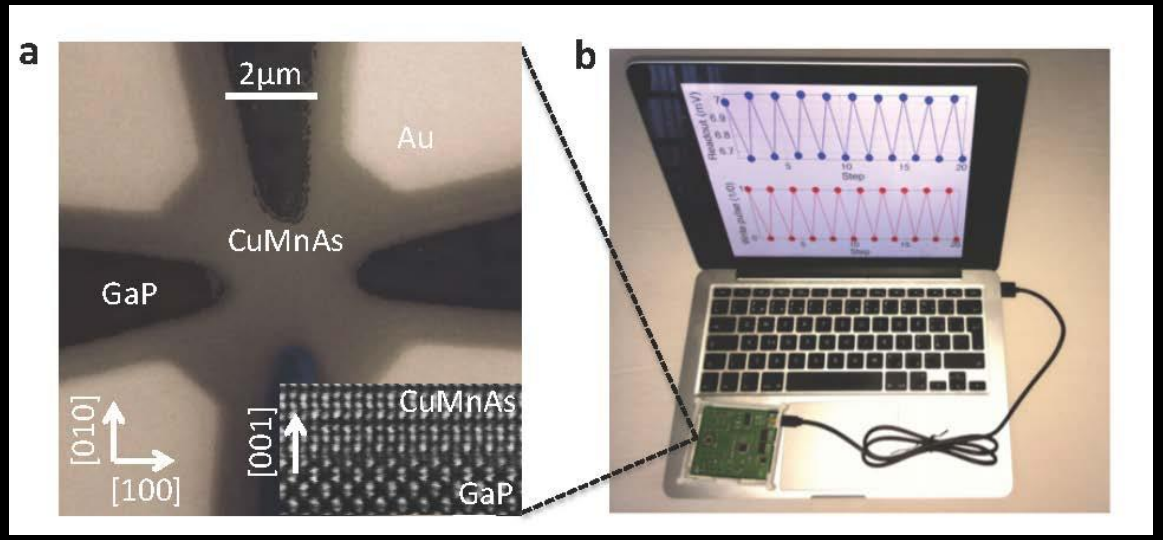
CENTER FOR FREE-ELECTRON LASER SCIENCE, HAMBURG

FEROMAGNETICKÁ ZÁZNAMOVÁ TECHNOLOGIE

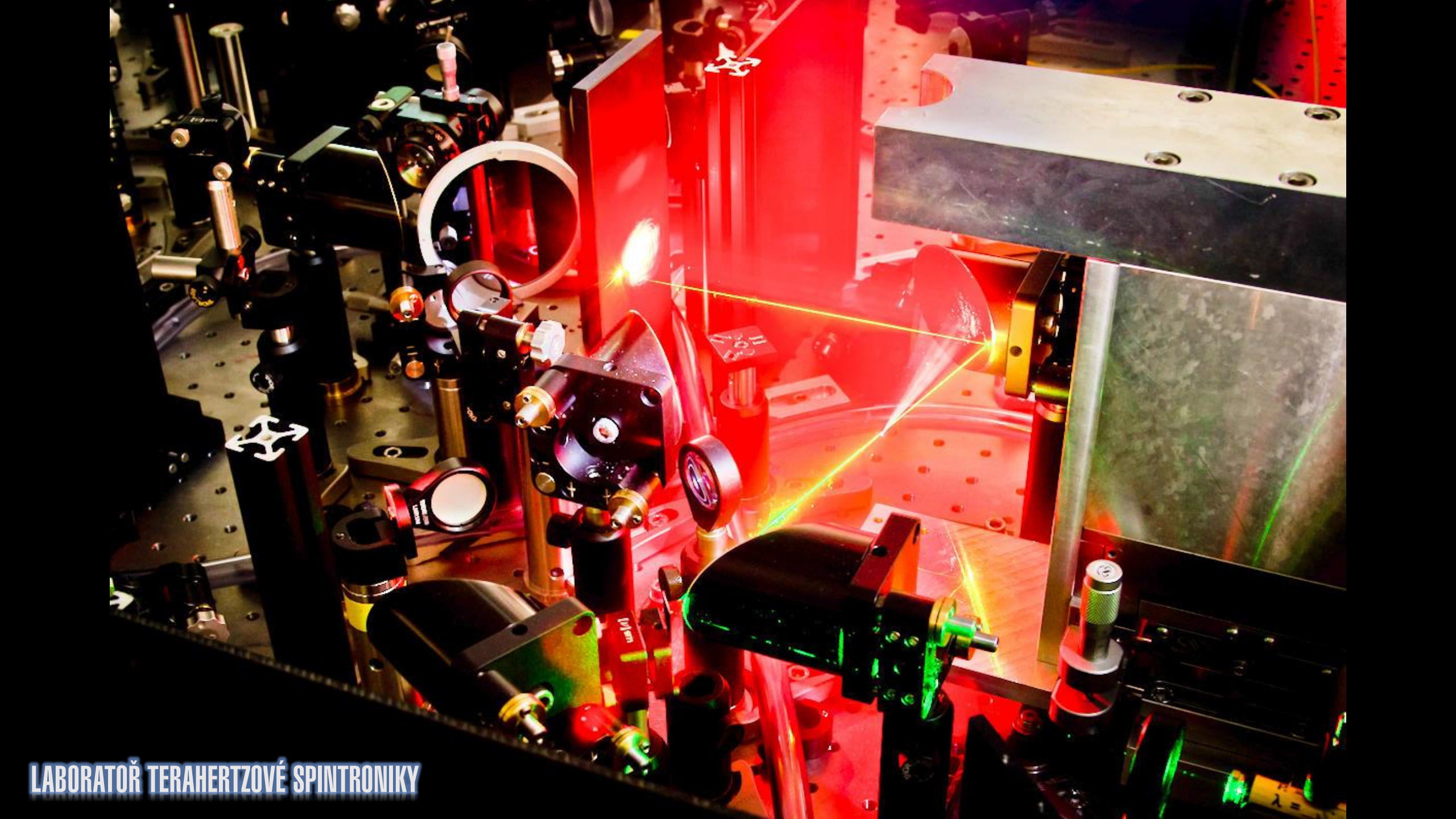


ANTI-FEROMAGNETICKÁ ZÁZNAMOVÁ TECHNOLOGIE



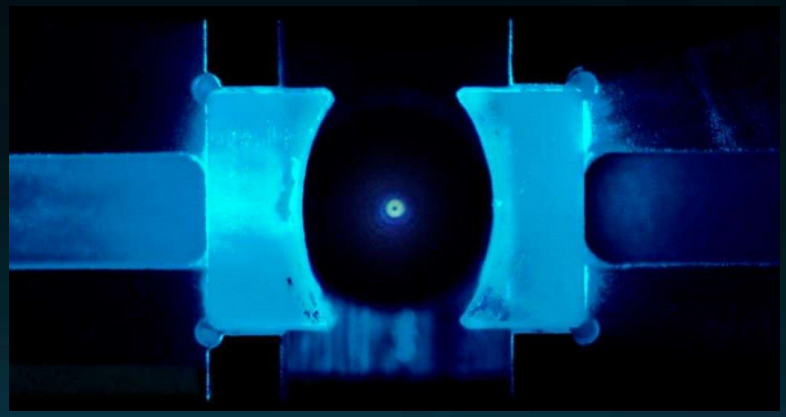


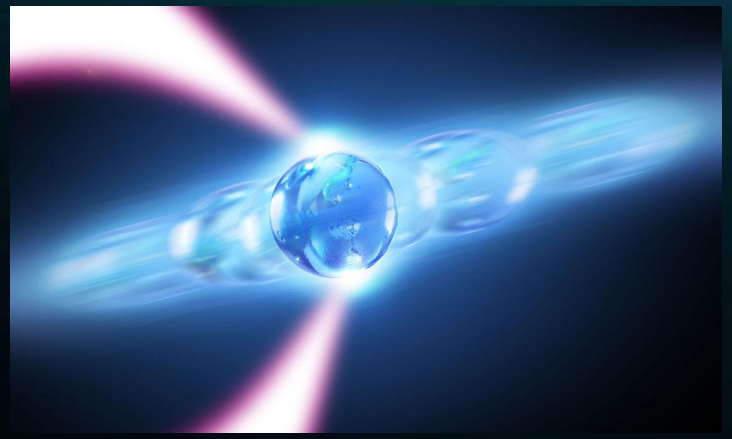
K. OLEJNIK ET AL. NATURE COMMUNICATIONS 8, 15434 (2017).

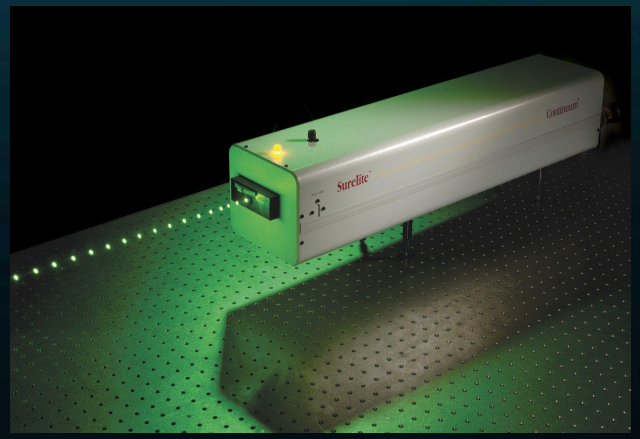

LABORATOŘ TERAHERTZOVÉ SPINTRONIKY

„DOKÁŽOU BÝT ANTIFEROMAGNETICKÉ PAMĚTI 1000X RYCHLEJŠÍ NEŽ SOUČASNÉ PROCESORY?"

LABORATOŘ TERAHERTZOVÉ SPINTRONIKY
MATEMATICKO-FYZIKÁLNÍ FAKULTA UK






Surelite
Continuum

LUKÁŠ NÁDVORNÍK
NADVORNIK@KARLOV.MFF.CUNI.CZ

matfyz