Lectures in LASER Physics

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27 – 08 -2024

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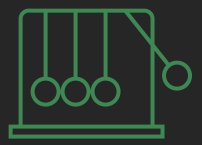
Summer School

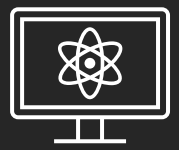
Day Three

Day Three



Types of Lasers

Applications of Laser



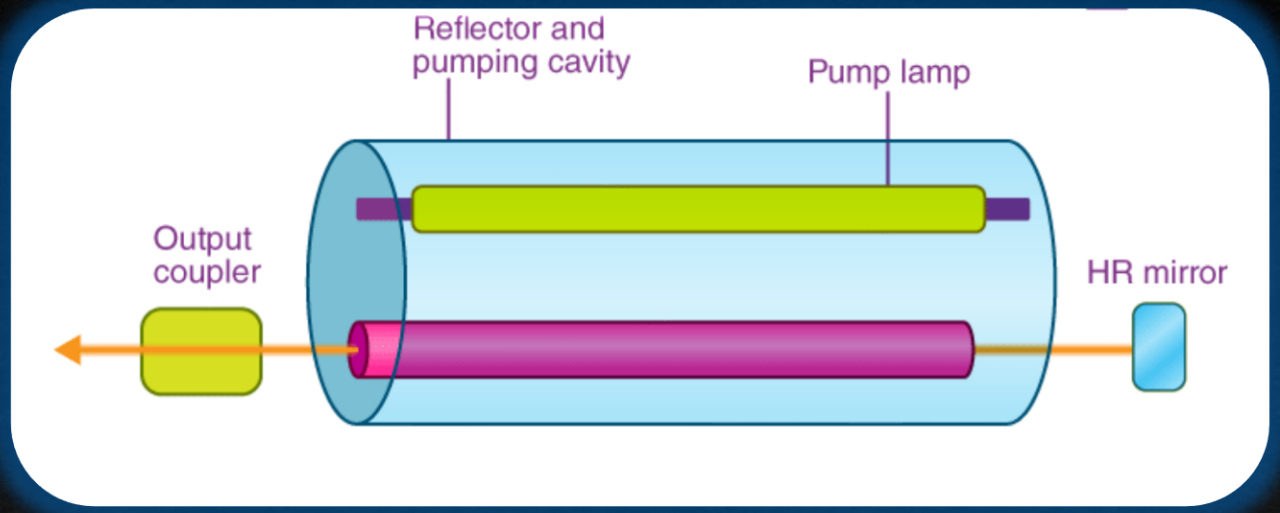
Summary of the lectures

Some Types of LASER

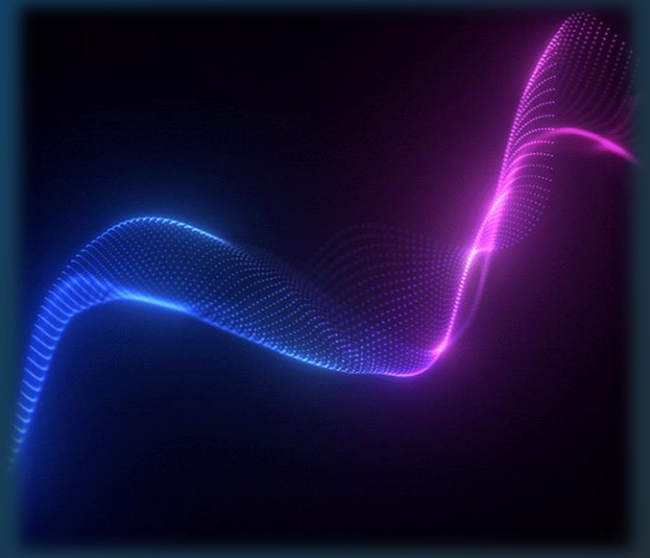
- Solid Sate Laser
- Gas lasers
- Liquid lasers
- Semiconductor lasers
- Fiber lasers

LASER

Solid Sate Laser



Laser rods (from left to right): Ruby, alexandrite, Er:YAG, Nd:YAG



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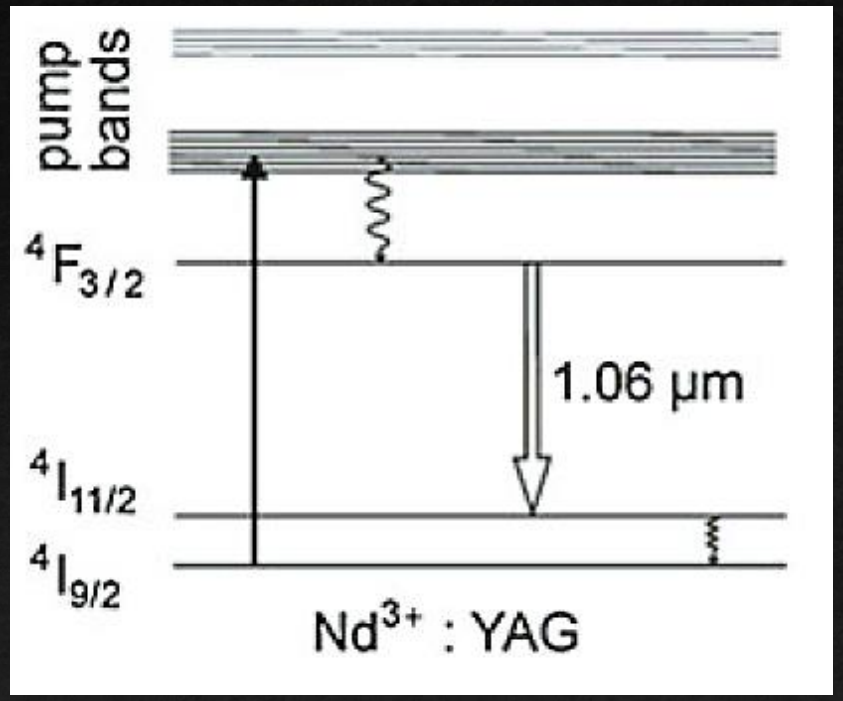
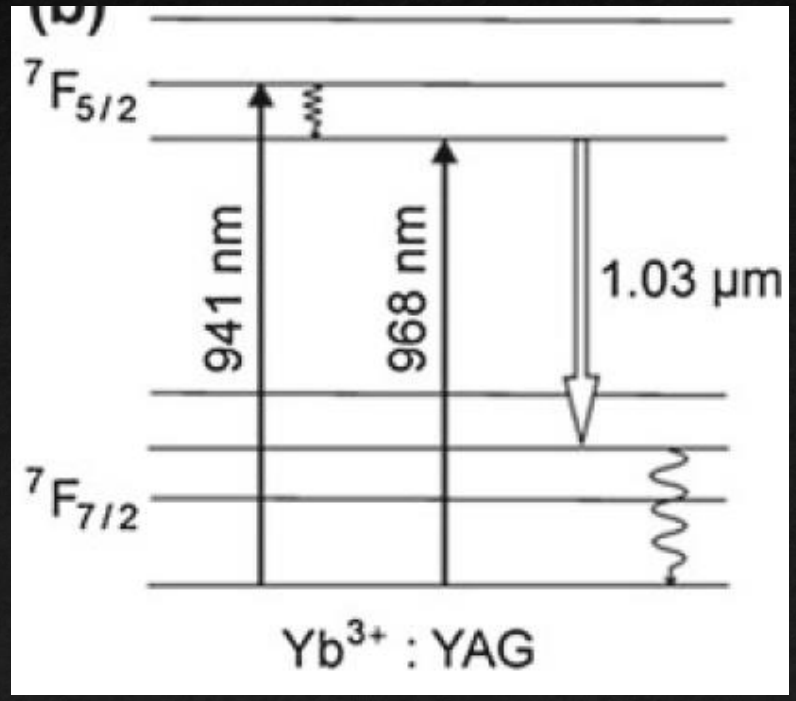
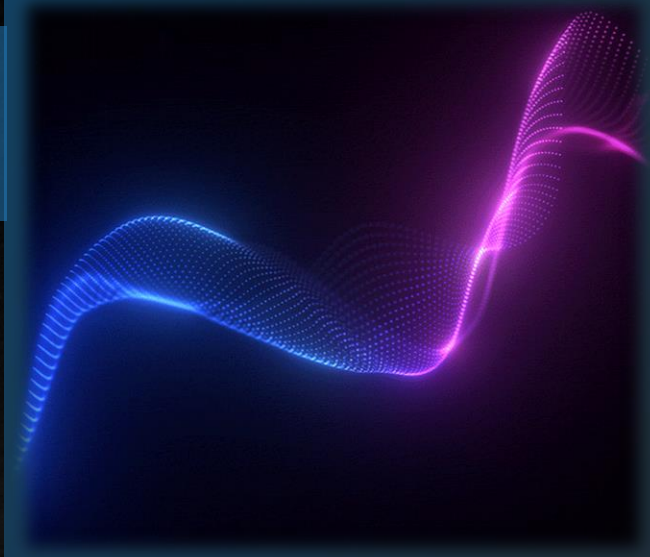
Solid Sate Laser → YAG Laser

A YAG laser (YAG = $Y_3Al_5O_{12}$= yttrium aluminum garnet) can have a high beam quality and can be operated as a CW or as a pulsed laser.





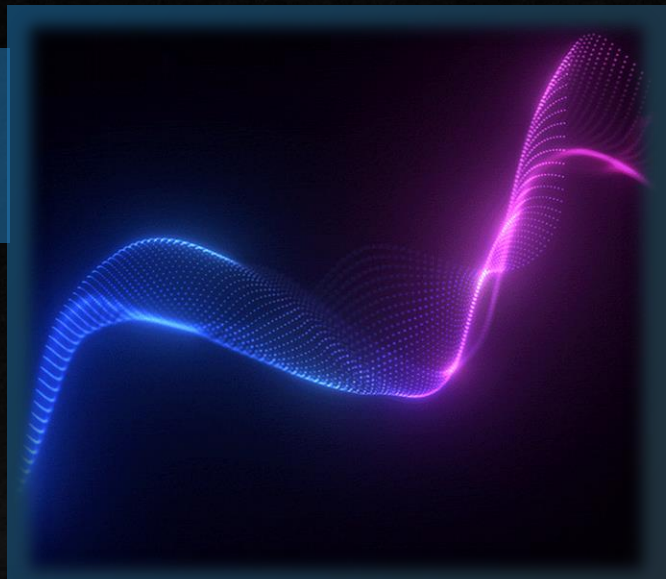


LASER

Solid Sate Laser → YAG Laser

A YAG laser (YAG = $Y_3Al_5O_{12}$= yttrium aluminum garnet) can have a high beam quality and can be operated as a CW or as a pulsed laser.

Laser	λ	λ_{pump} (nm)	τ_{sp} (μs)	$\Delta\nu_g$	σ_{21} (m^2)
Nd:YAG	1.06 μm;	808	230	140 GHz	3×10^{-22}
Yb:YAG	1.03 μm;	941 968	960	1.7 THz	2.1×10^{-24}
Pr:YAG	1.03 μm	941			
Er:YAG	2.94 μm	800 970			



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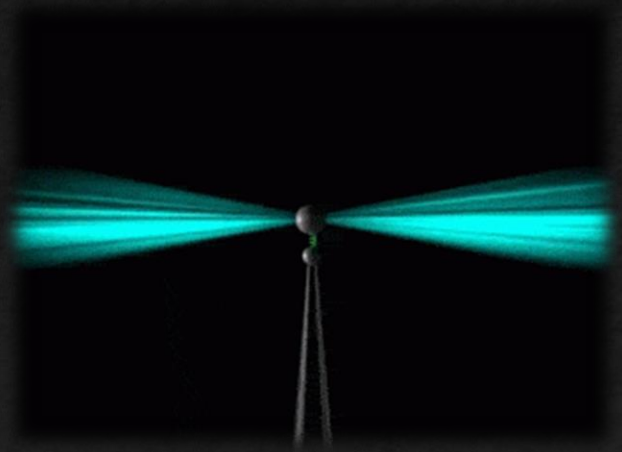
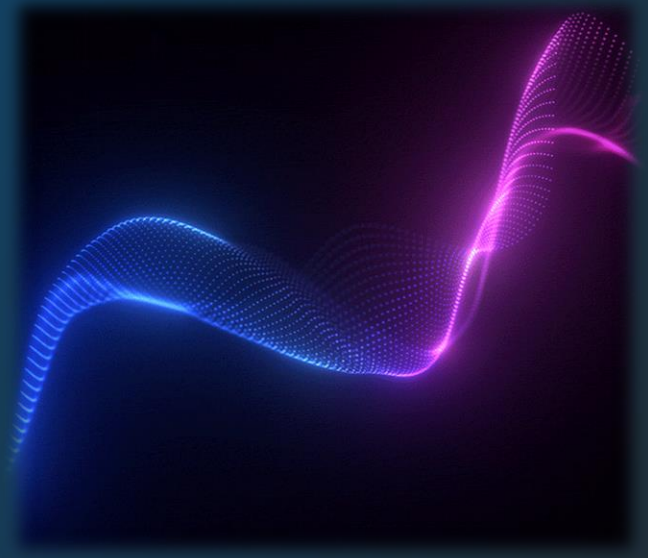
Nd:YAG Laser Applications

- Manufacturing

- Biophysics: Optical Tweezer





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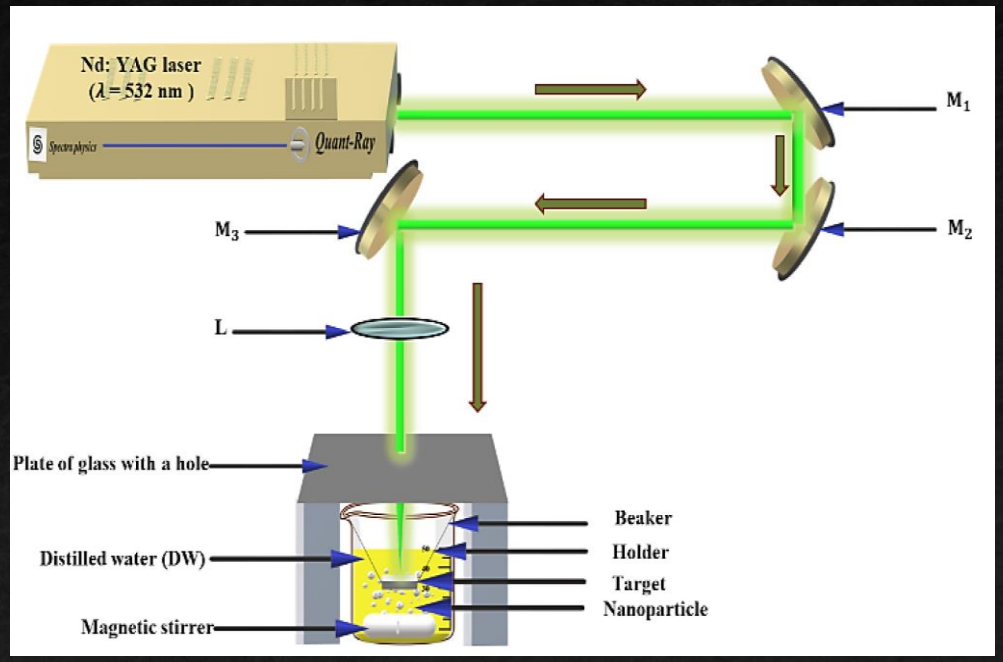
Nd:YAG Laser Applications

- LASER Ablation



nanomaterials
MDPI

Article

Using Femtosecond Laser Pulses to Explore the Nonlinear Optical Properties of Au NP Colloids That Were Synthesized by Laser Ablation

Mohamed Ashour [1,2], Hameed G. Faris [3], Hanan Ahmed [1], Samar Mamdouh [1], Kavintheran Thambiratnam [4] and Tarek Mohamed [1,5,*]

materials
MDPI

Article

Excitation Wavelength and Colloids Concentration-Dependent Nonlinear Optical Properties of Silver Nanoparticles Synthesized by Laser Ablation

Tarek Mohamed [1,2,*], Majed H. El-Motlak [3], Samar Mamdouh [1], Mohamed Ashour [1,4], Hanan Ahmed [1], Hamza Qayyum [5] and Alaa Mahmoud [1]

nanomaterials
MDPI

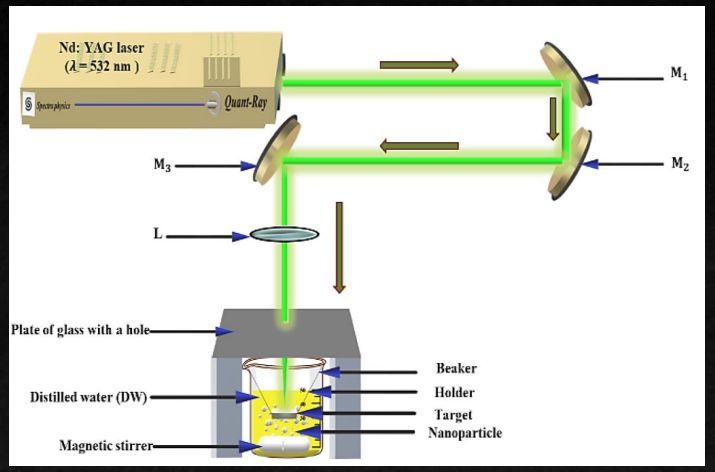
Article

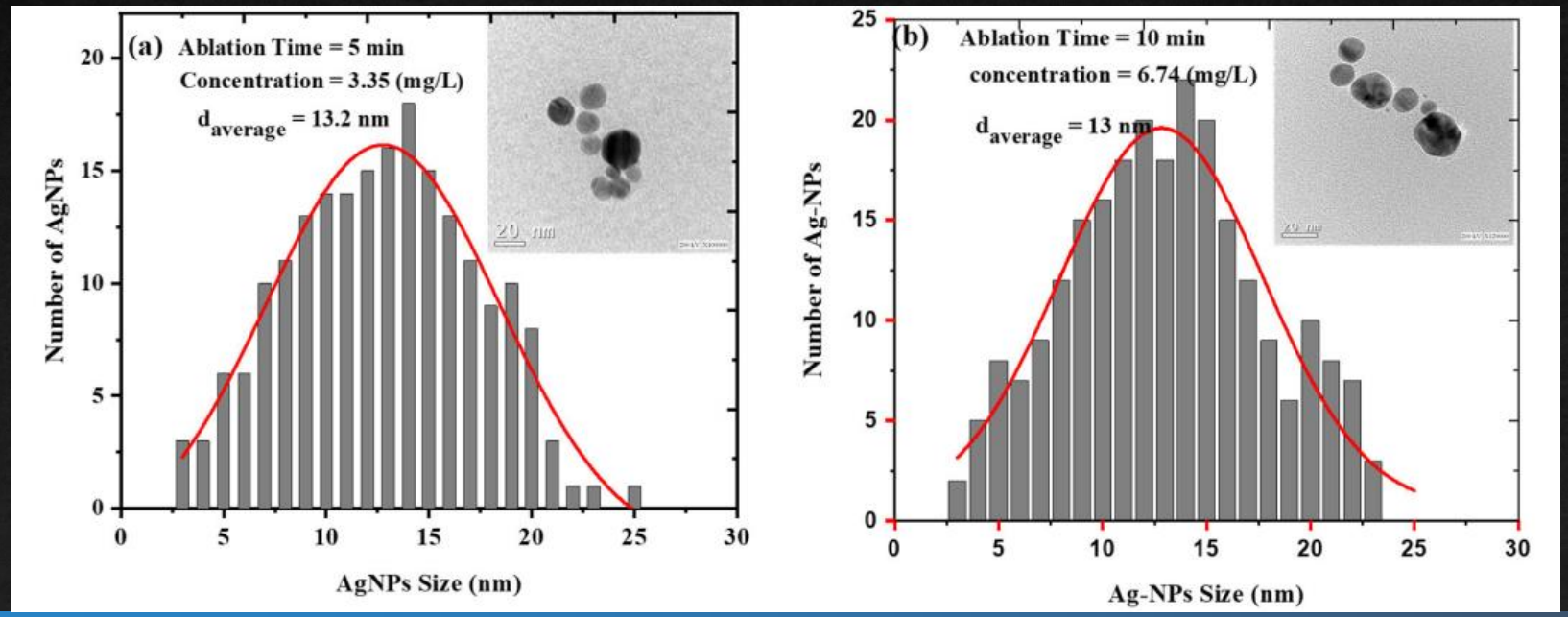
Nonlinear Optical Properties of Zinc Oxide Nanoparticle Colloids Prepared by Pulsed Laser Ablation in Distilled Water

Tarek Mohamed [1,2,*], Ali Farhan [3], Hanan Ahmed [1], Mohamed Ashour [1,4], Samar Mamdouh [1] and Reinhold Schuch [5]

Nd:YAG Laser Applications

- LASER Ablation





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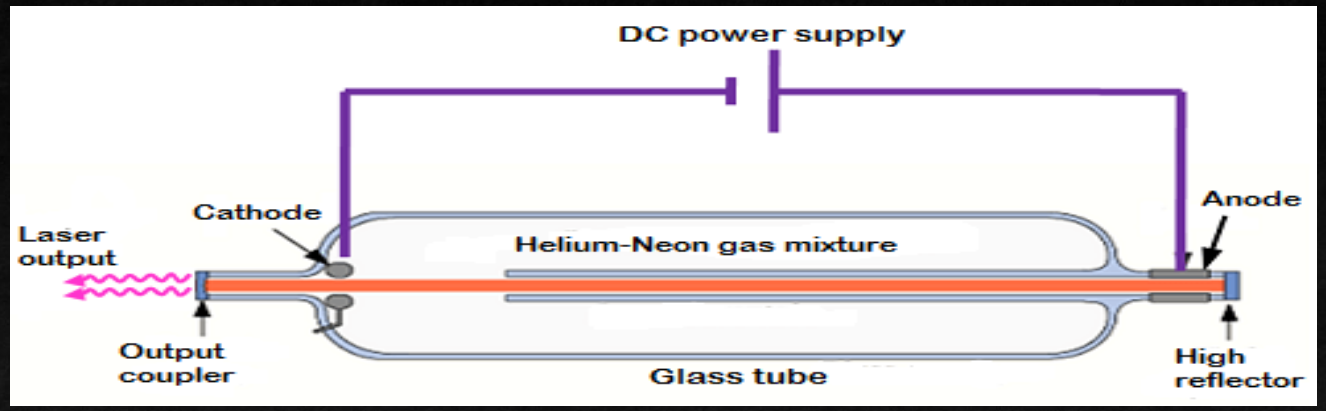
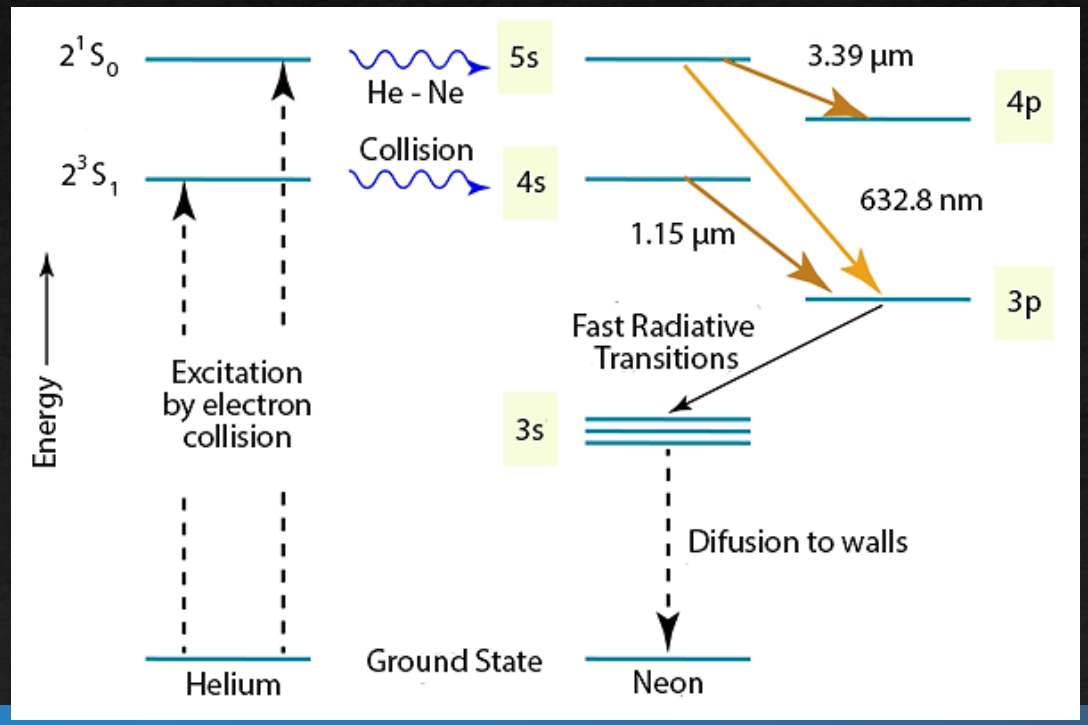
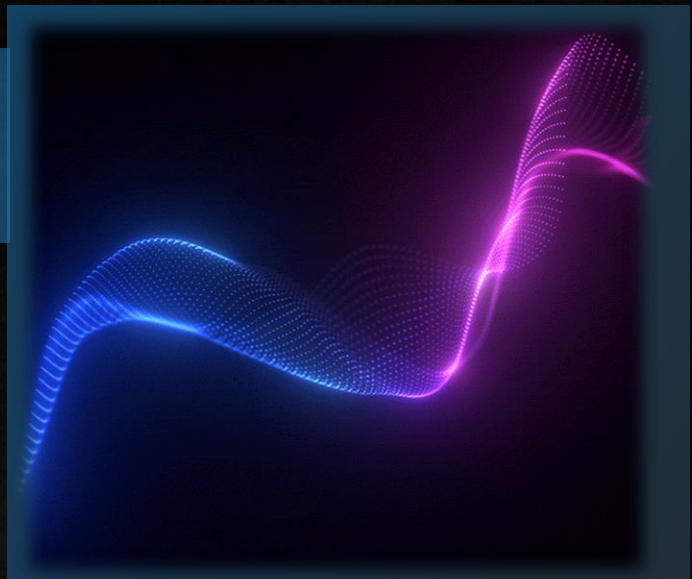
GAS Laser → He-Ne LASER







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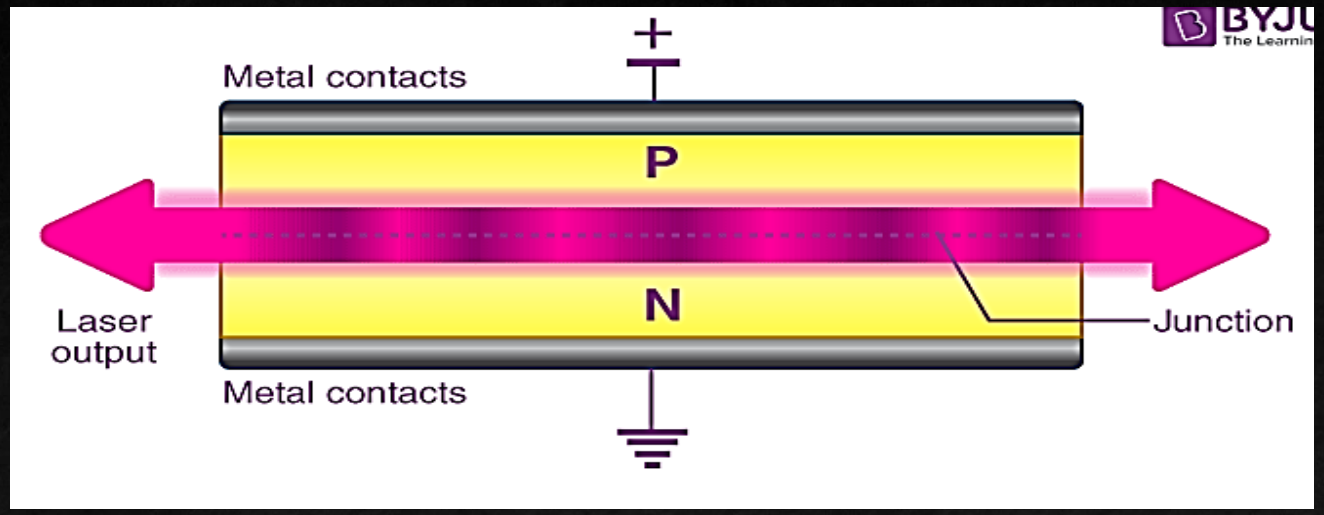
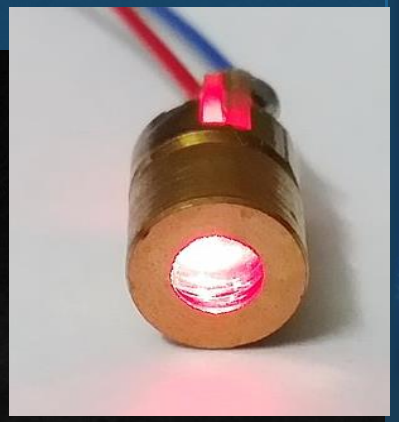
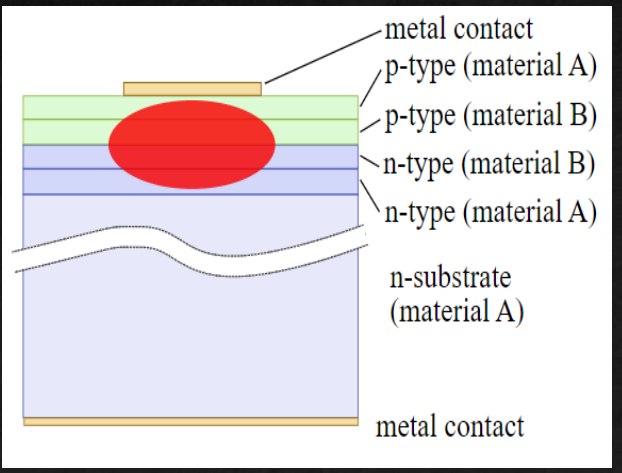
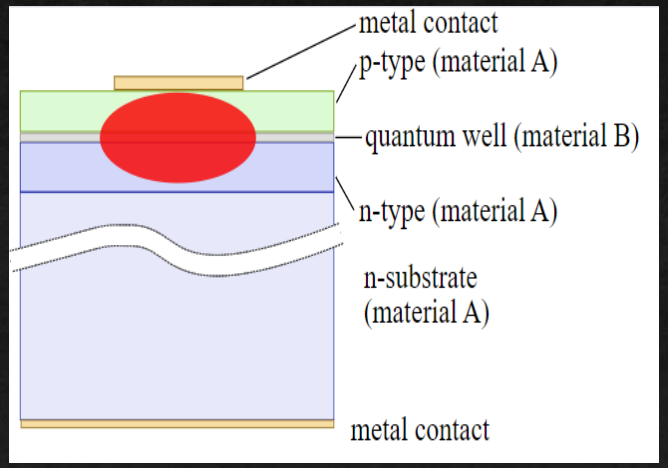
Semiconductor Laser



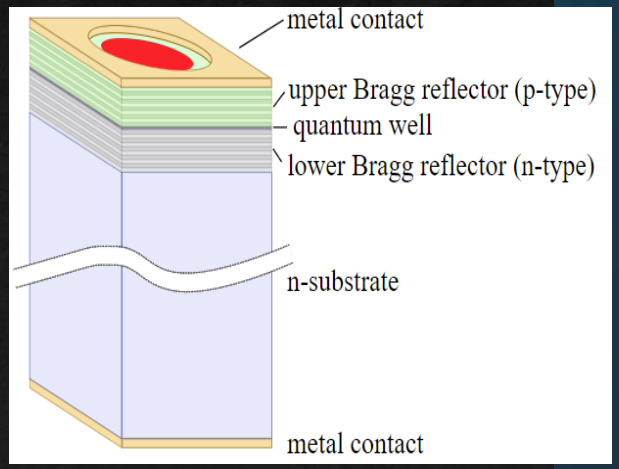




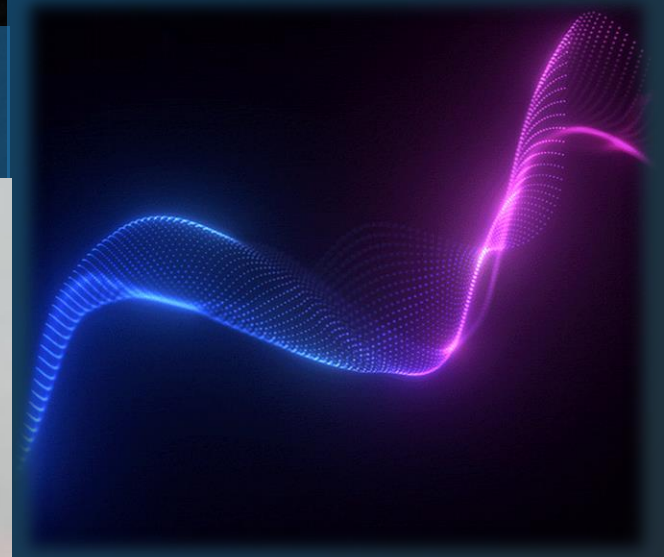
Double heterostructure



Quantum well laser diode



VCSEL structure



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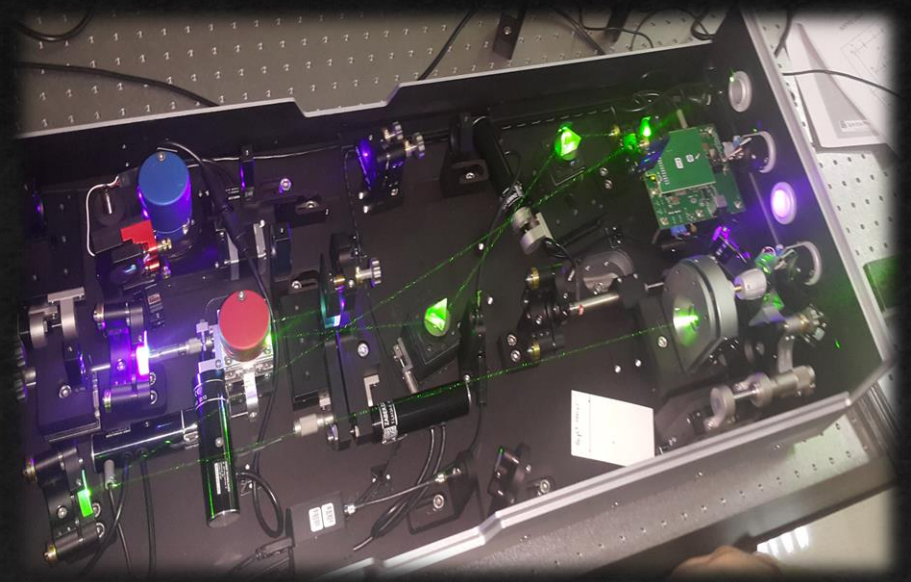
LASER in new version

Inspire Laser (HF 100)



LASER

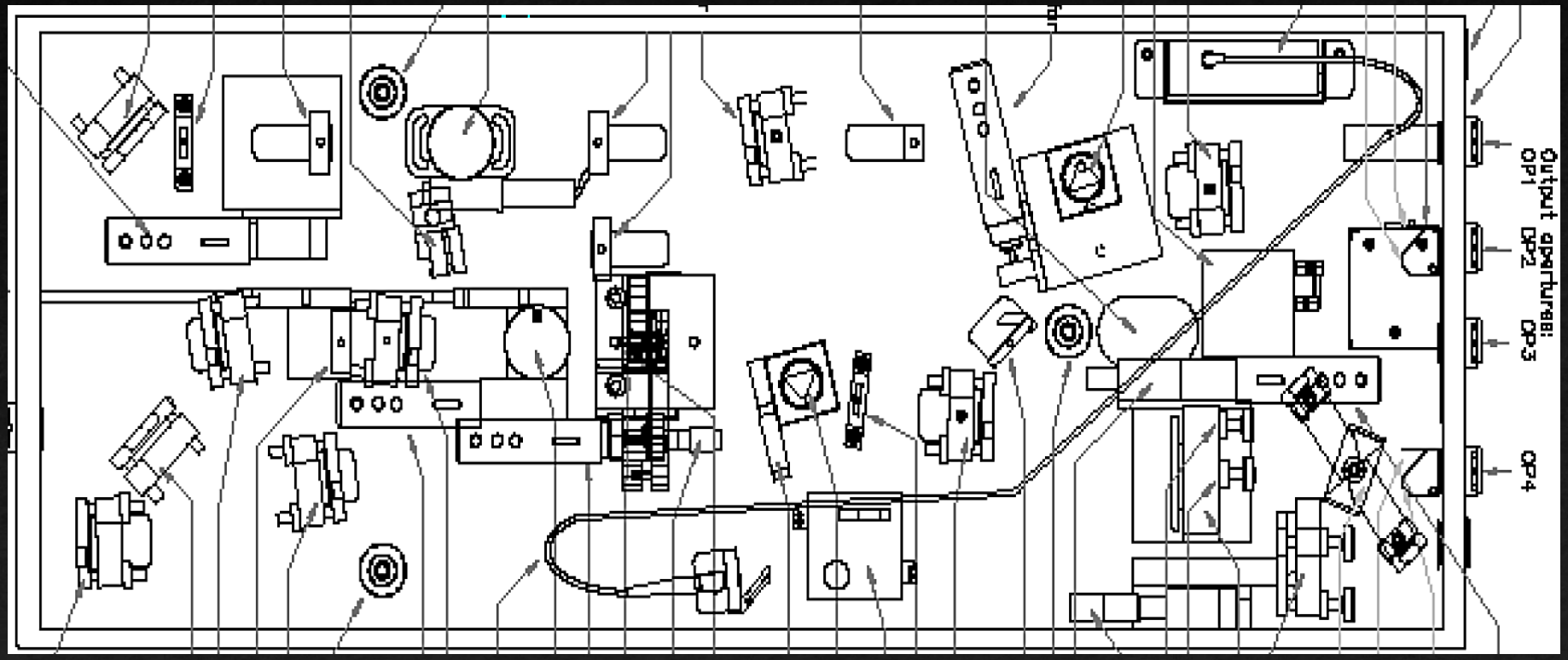
LASER in new version

Inspire Laser (HF 100)

LASER

LASER in new version

Inspire Laser (HF 100)



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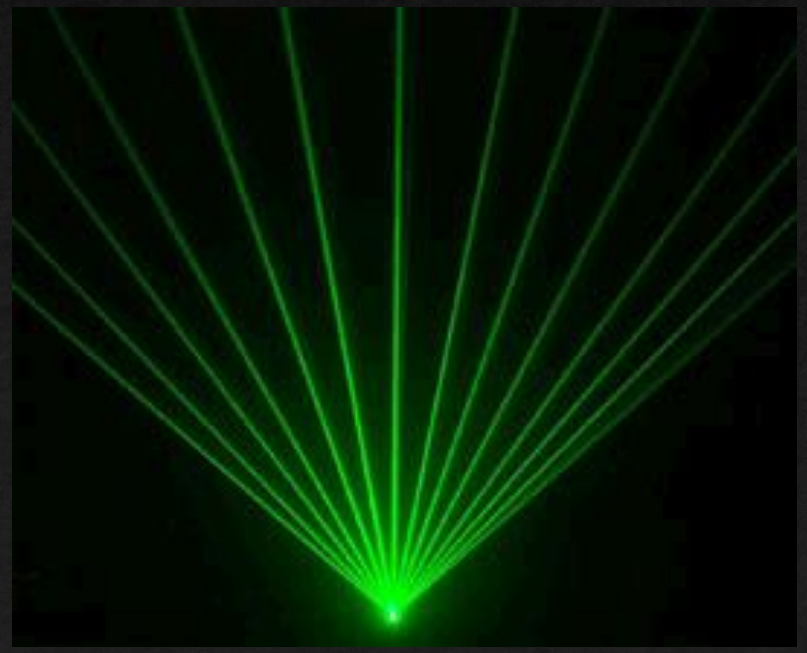
How does a green laser pointer work?

- ✓ *How a greed laser pointer works ?*
- ✓ *Why its so bright?*



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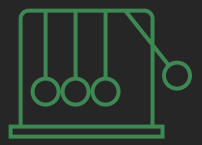
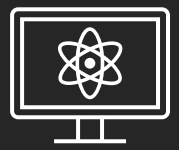
Day Three



Types of Lasers

Applications of Laser



Summary of the lectures

LASER Applications

The most significant applications of lasers include:

- Lasers in medicine
- Lasers in communications
- Lasers in industries
- Lasers in science and technology
- Lasers in military

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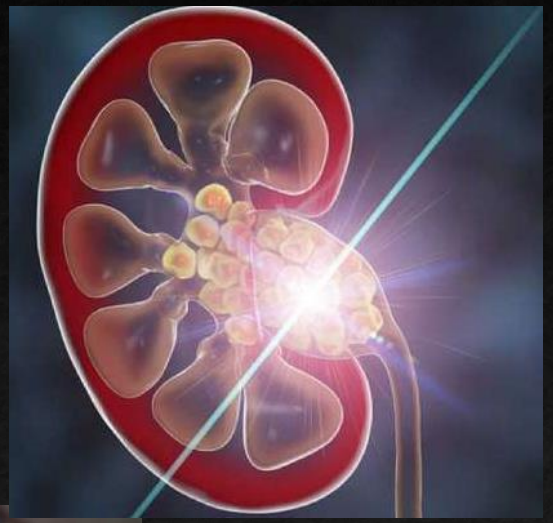
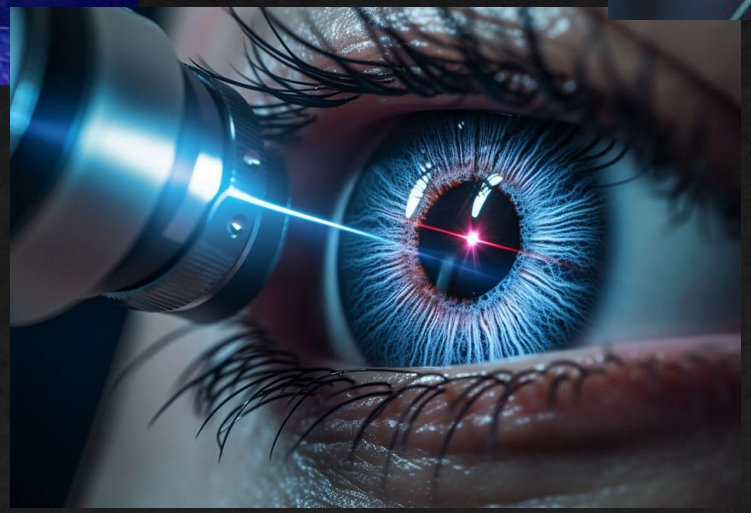
LASER Applications

- Lasers in medicine





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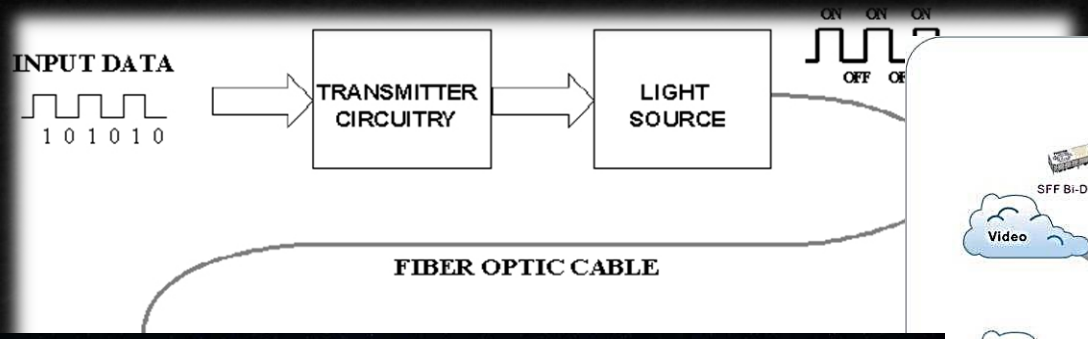
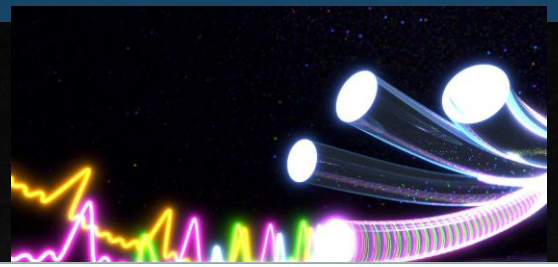
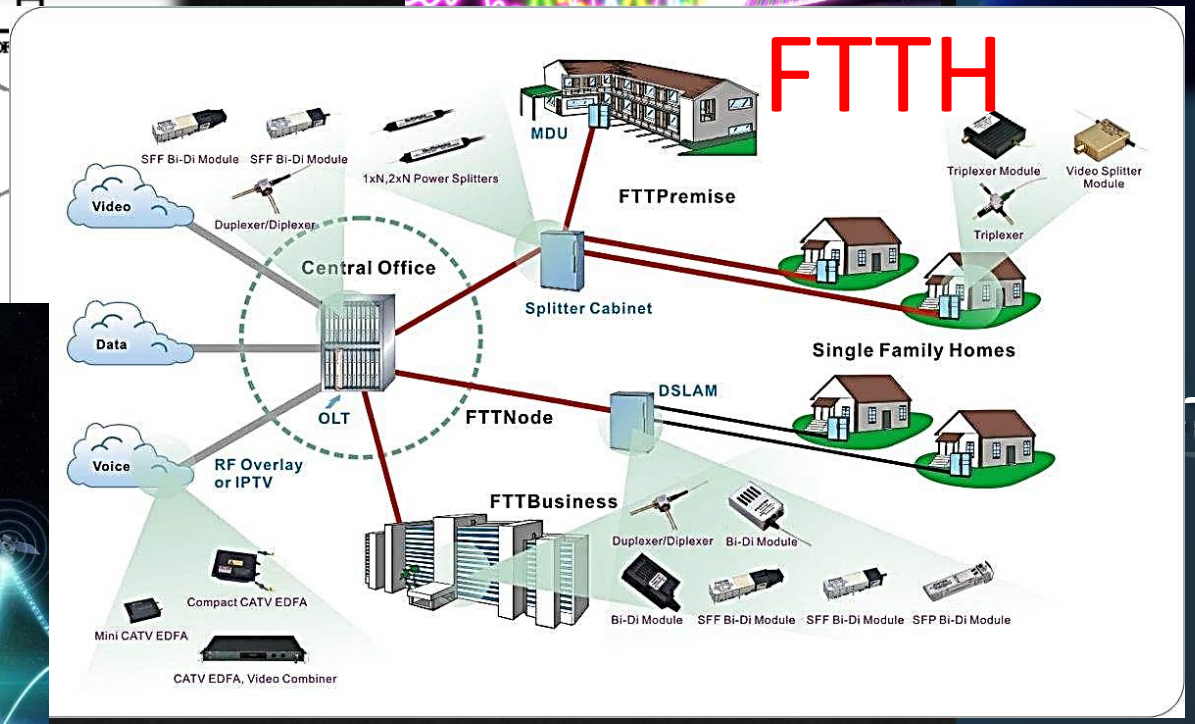
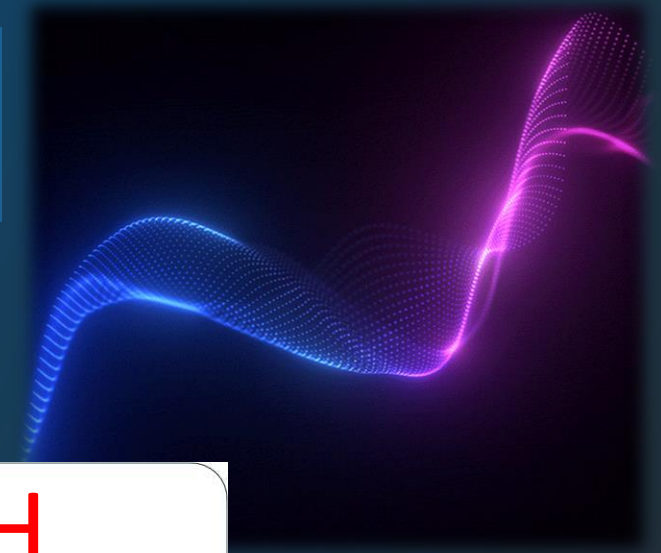
LASER Applications

- Lasers in communications









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LASER Applications

- Lasers in Military

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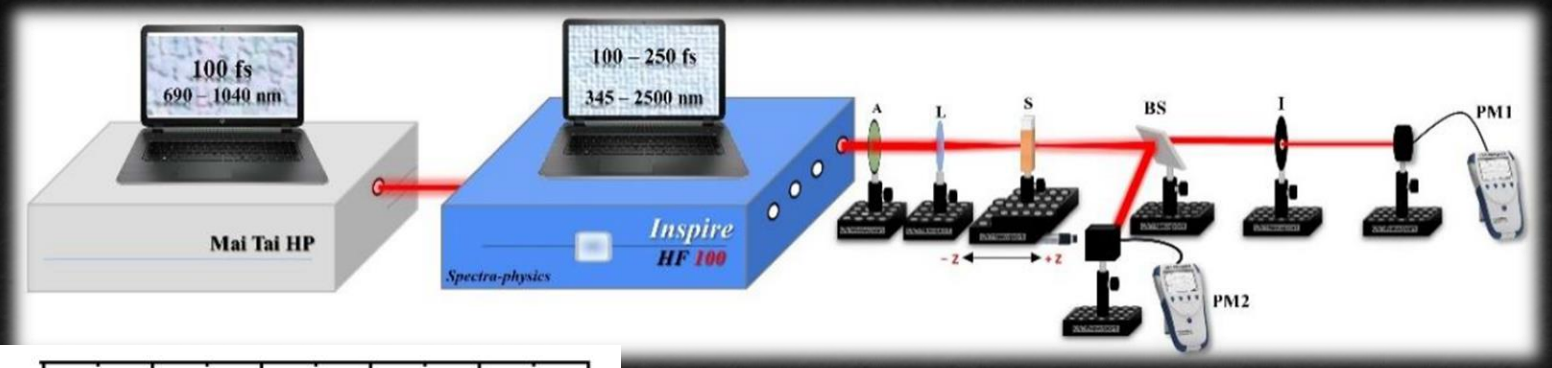
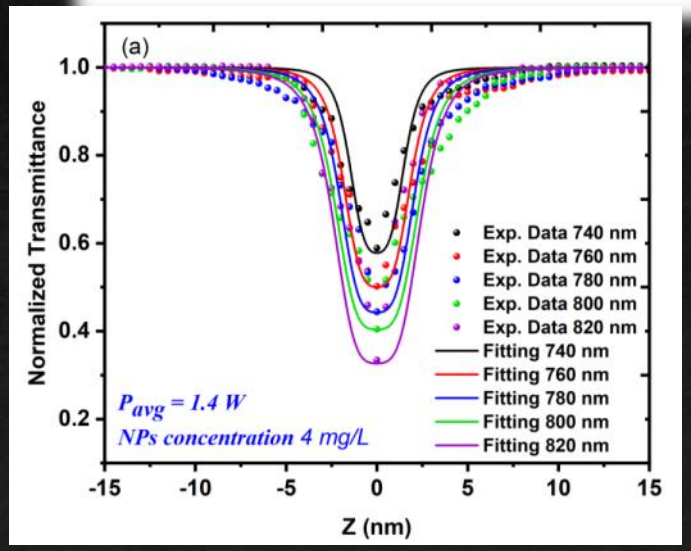
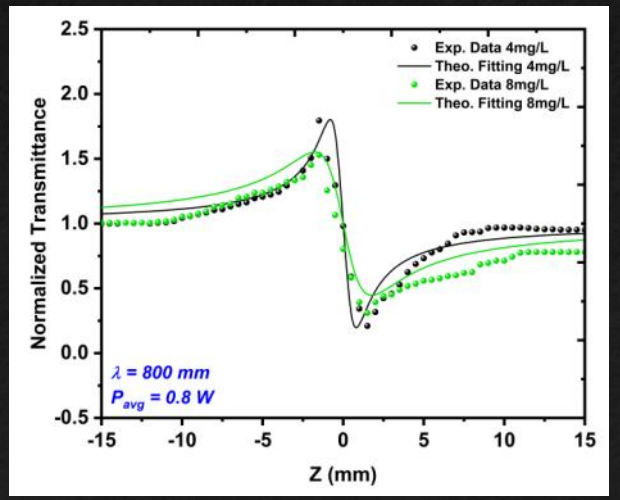
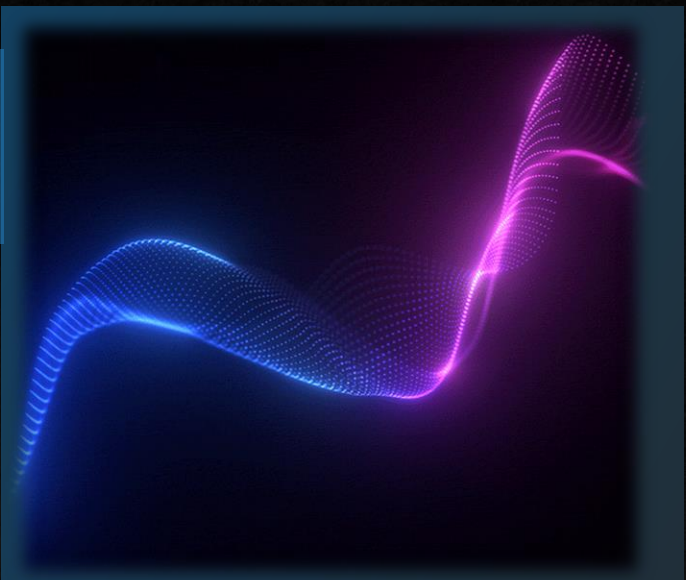
LASER Applications

- Lasers in science and technology









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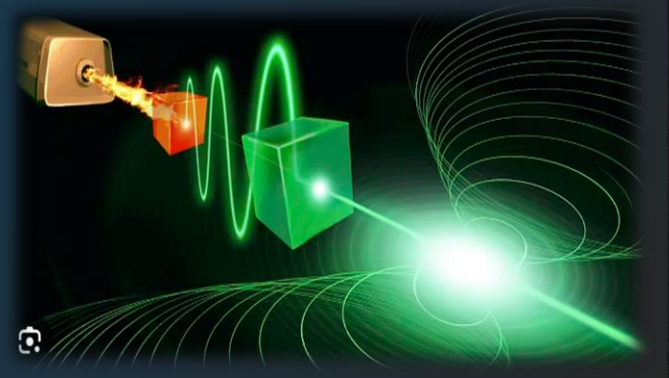


LASER Applications

- Lasers in agriculture

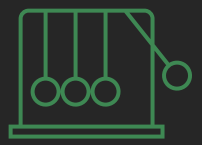
LASER

LASER Applications

- Lasers in archeology

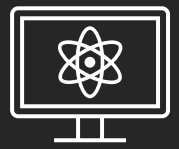
LASER

Day Three



Types of Lasers

Applications of Laser

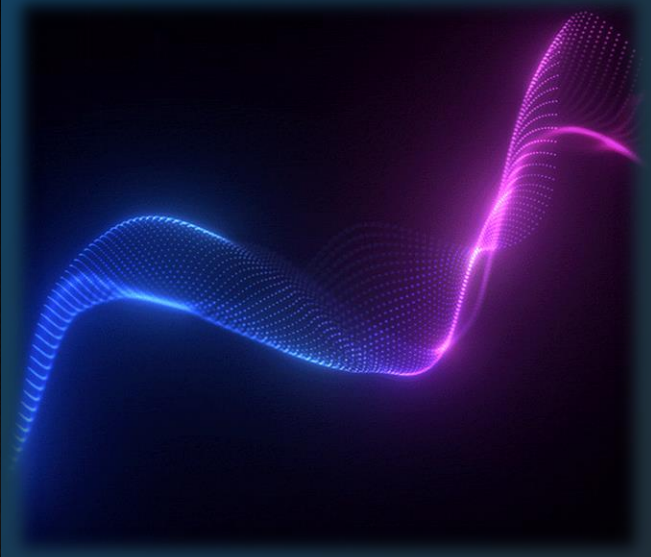


Summary of the lectures

What do you think?

1960

Laser is a solution seeking a problems



LASER

Thank you for your time

Enjoy your day