

# Outline for Lasing Without Inversion SUPASTA Essay

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## References

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## **1 Abstract (~100 words)**

## **2 Introduction (~300 words)**

[1, 2, 3, 4, 5, 6, 7, 8, 9]

## **3 Theoretical Methodology (~750)**

### **3.1 Normal Laser with Inversion 2-level system) (~250 words)**

### **3.2 Amplification without Inversion (AwI) 3-level system (~250 words)**

### **3.3 Amplification without Inversion (AwI) Multi-level system (~250 words)**

## **4 Experimental Confirmation (~750 words)**

### **4.1 First confirmation of AwI, Zeeman coherence (~250 words)**

Nottelmann et al. 1993 [10]

### **4.2 2nd confirmation of AwI, D<sub>1</sub> line atomic sodium (~250 words)**

Fry et al. 1993 [11]

### **4.3 3rd confirmation of AwI, Cadmium Vapour (~250 words)**

van der Veer et al. 1993 [12]

## **5 Applications (~750 words)**

### **5.1 Short wavelength lasers**

#### **5.1.1 X-ray lasers (~250 words)**

#### **5.1.2 $\gamma$ - ray lasers (~250 words)**

### **5.2 Electromagnetically Induced Transparency (~250 words)**

## **6 State-of-the-art and Future Development (~300 words)**

## **7 Conclusion (~100 words)**

Word count: ~3050