Widely Tunable Integrated SOI Laser with Narrow Linewidth

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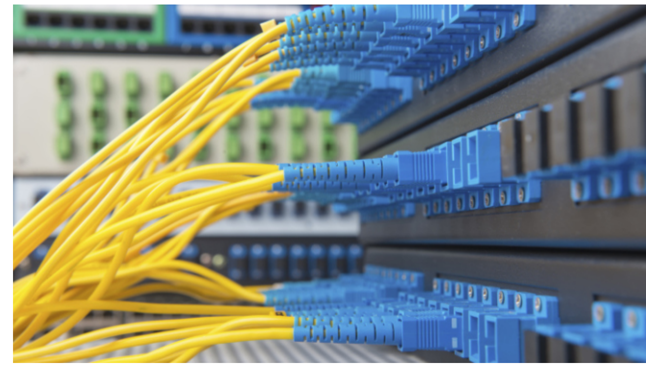
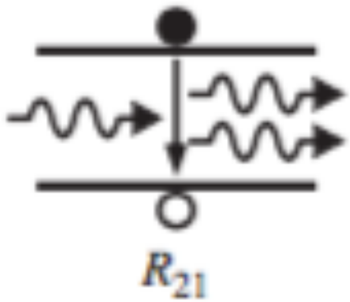


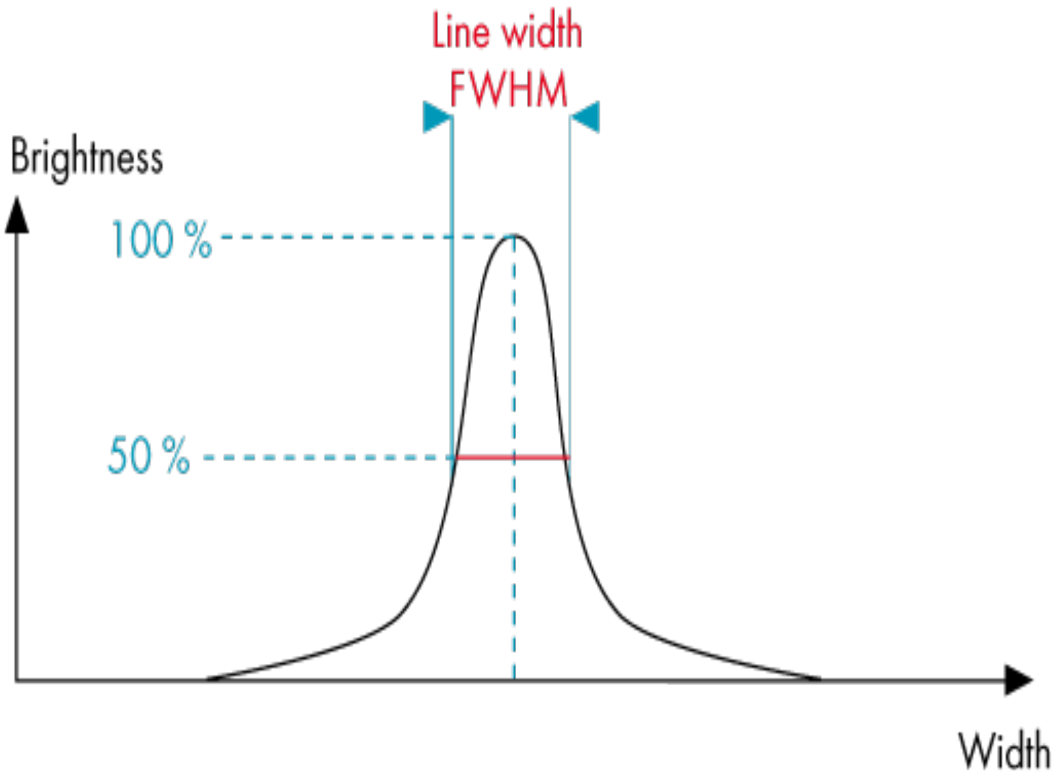
Optical Interconnects

Free space optical connections

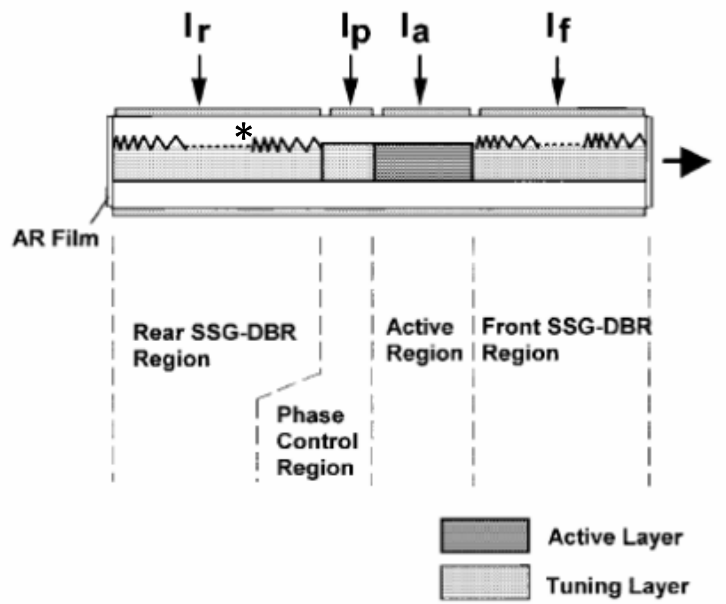
Simulating a Narrow Linewidth

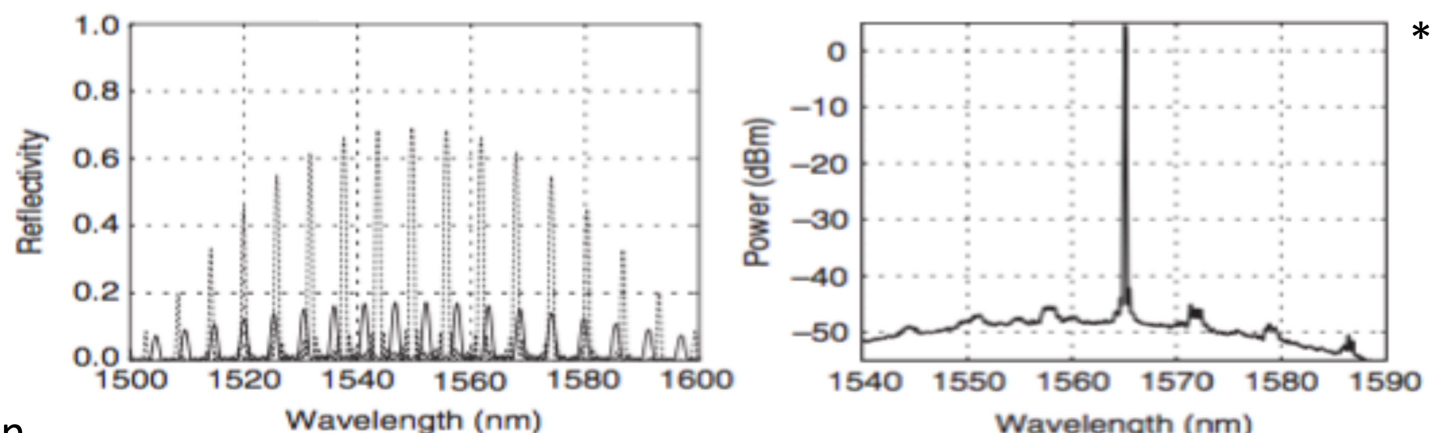


Stimulated Recombination



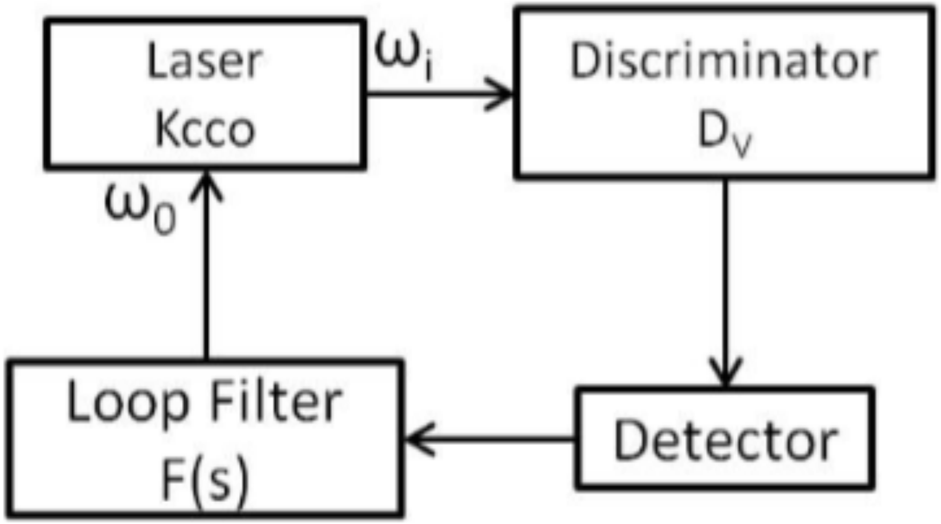
Sample Grating Distributed Bragg Reflector (SG-DBR)





*Coldren

SG-DBR in a Feedback Loop



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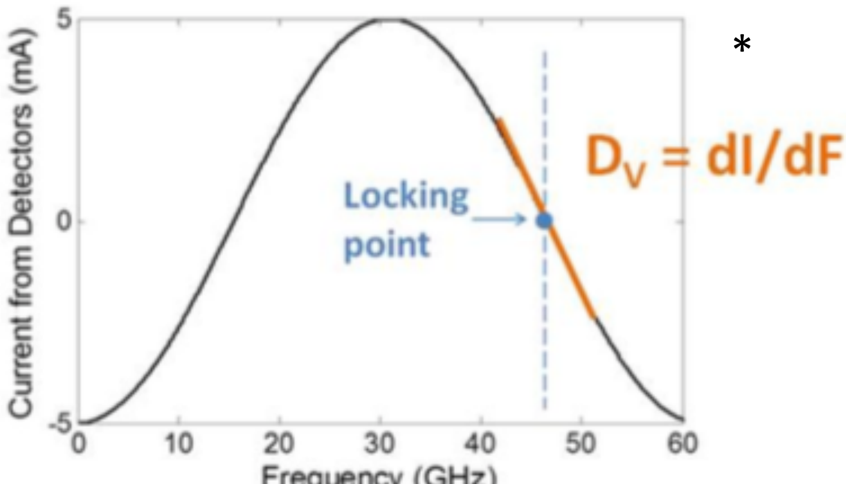
Sample Grating Distributed Bragg Reflector Laser (SG-DBR)



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Steeper slope has a narrower linewidth

*Abirami Sivananthan's Thesis

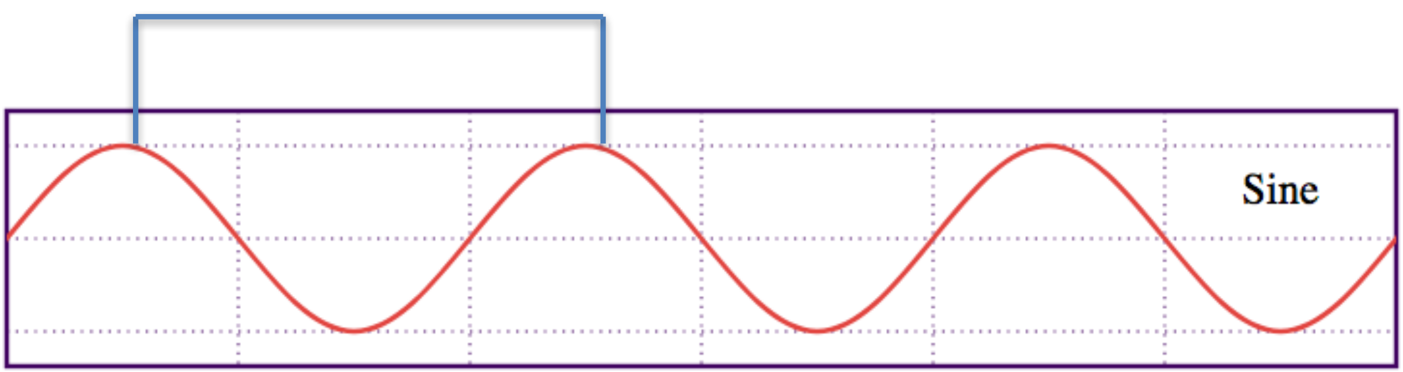
Sources of Noise

$$S_{f,cl} = \frac{n \times RIN \times FSR^2}{4} + \frac{q \times FSR^2}{2I_{DC}} + \frac{NF \times \frac{4k_B T}{R}}{\left(\frac{2I_{DC}}{FSR}\right)^2} \quad *$$

Closed Loop Spectral Density

Period of the Sinusoidal Discriminator Response

Optical Power Into Detector



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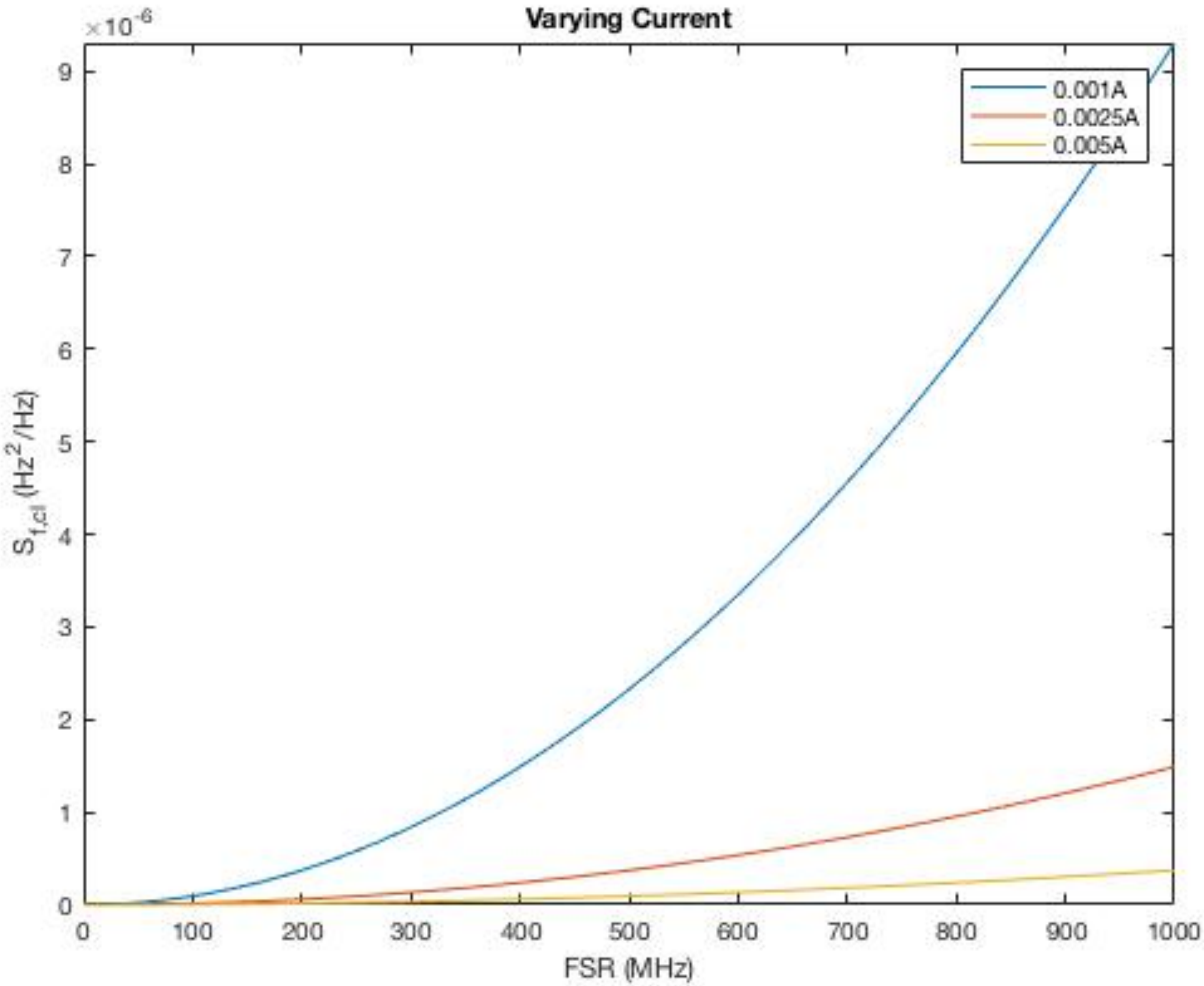
Graph of Sources of Noise

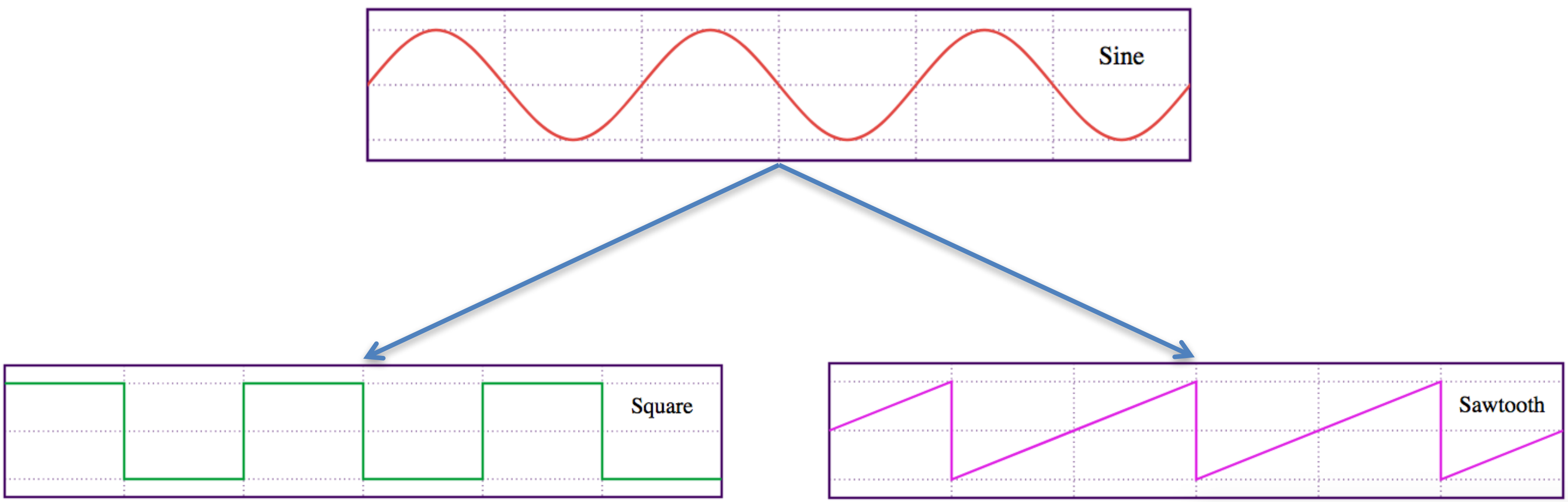


In Order to Attain a Narrow Linewidth

$$FSR = \frac{2I_{DC}}{D_V}$$

Minimize period of discriminator response

Maximize optical power into detector



Next Up, Fano Circuits

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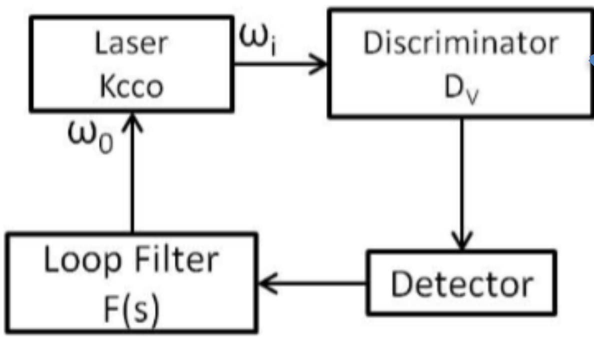
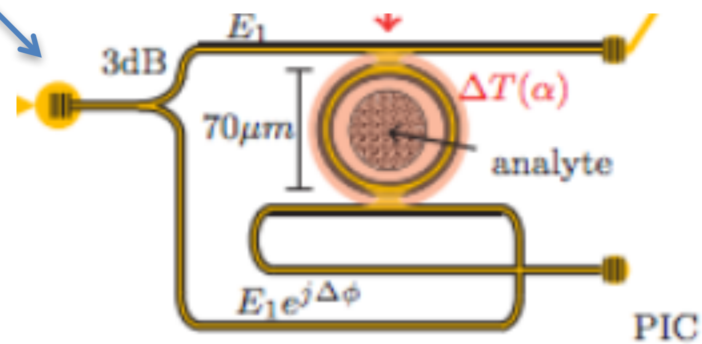


Fano circuit replaces Mach-Zehnder Interferometer



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*Abirami Sivananthan's Thesis

**Aditya Malik

Acknowledgements

Aditya Malik and Jonathan Klamkin

Abirami Sivananthan