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Light Emission in 2D Random Media

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EuroScholars Midstay Programme

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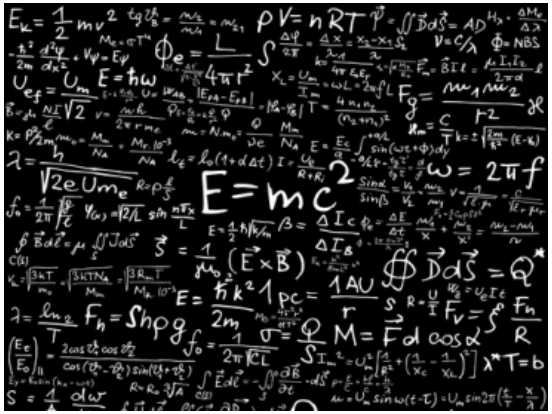
About Me



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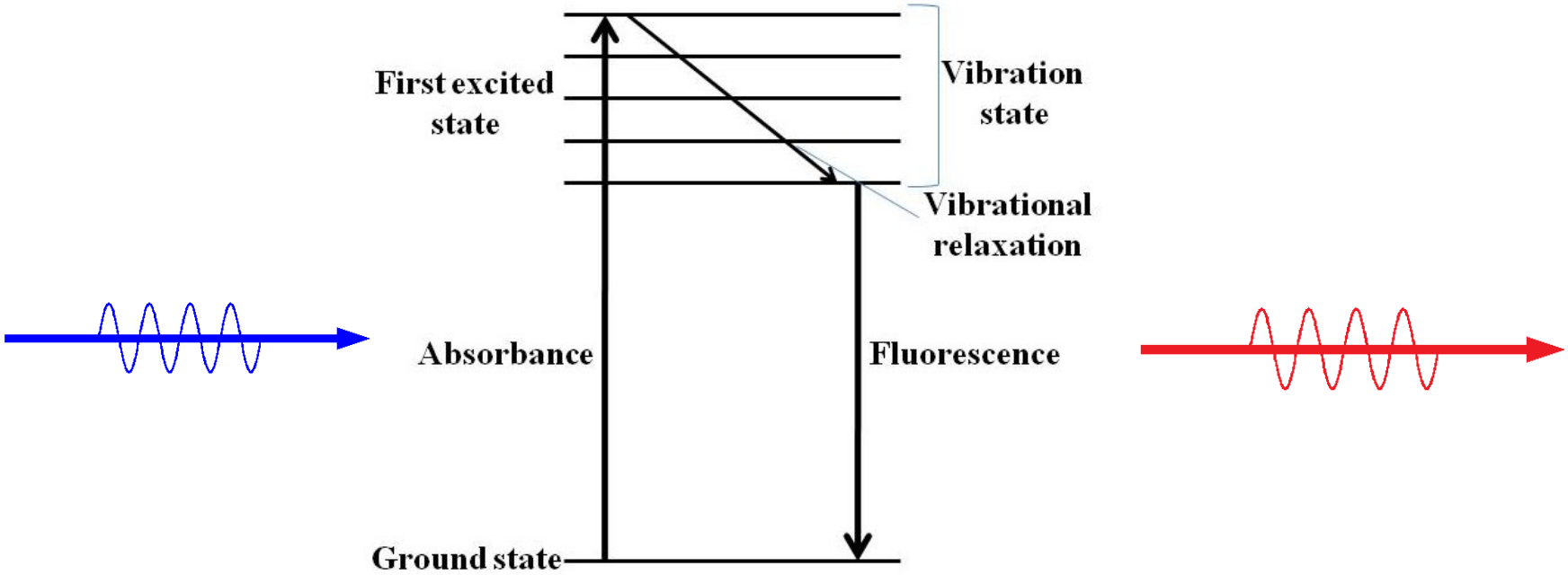
Light Emission : Fluorescence

- The most well known form of light emission is **fluorescence.**

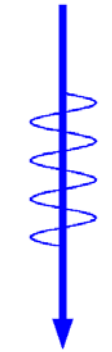
Light Emission : Fluorescence

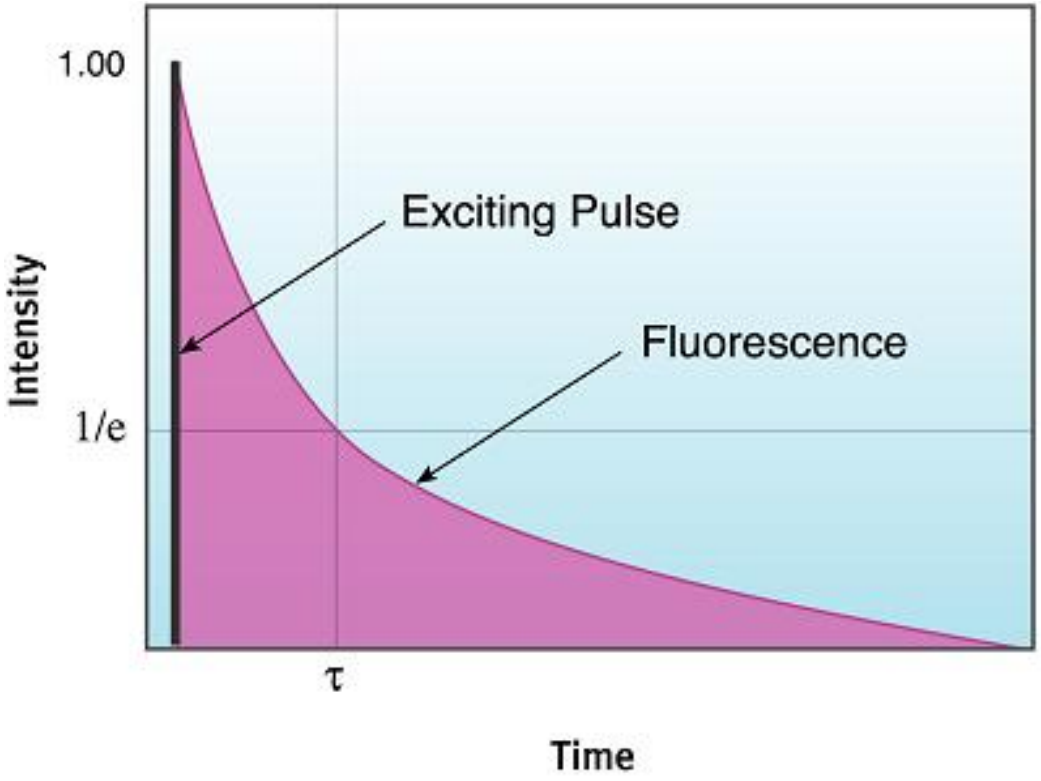
- Fluorescence is a simple result of energy absorption and energy emission.



Fluorescence Lifetime

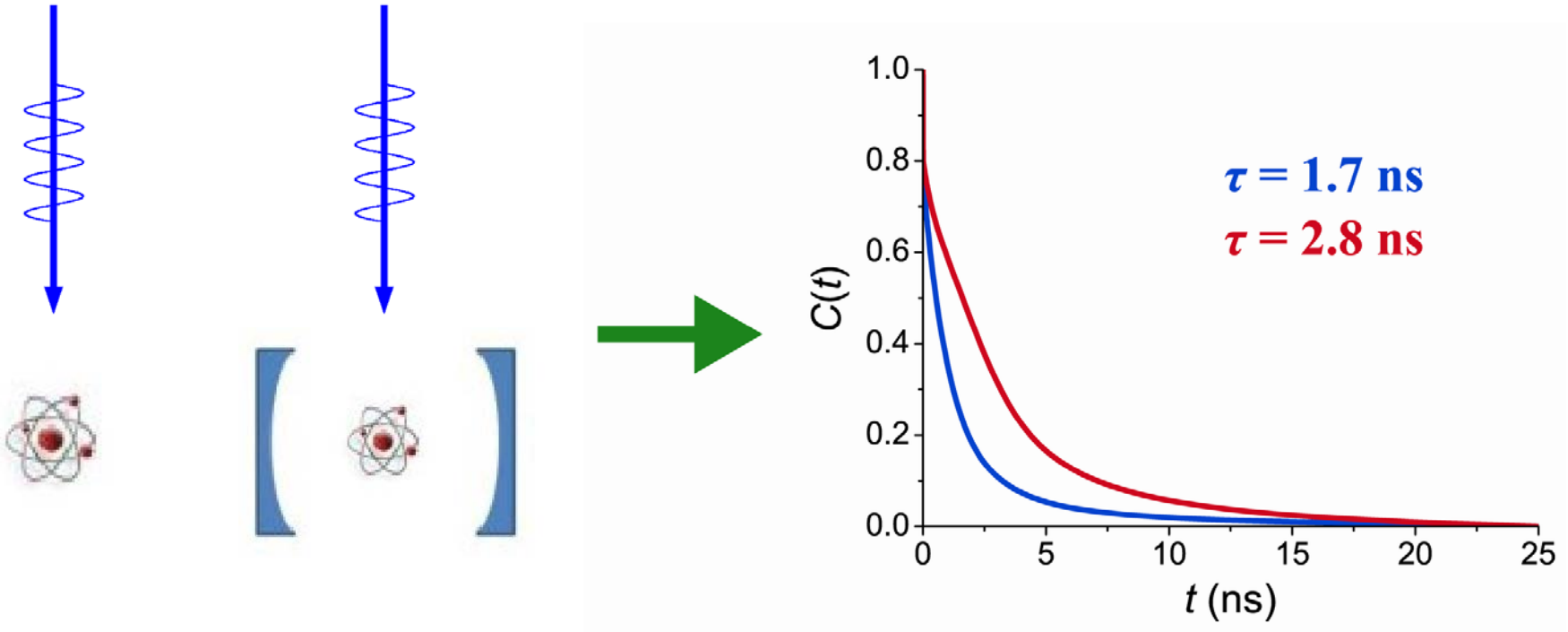
- We can characterize the fluorescence of an emitter by measuring the average lifetime.





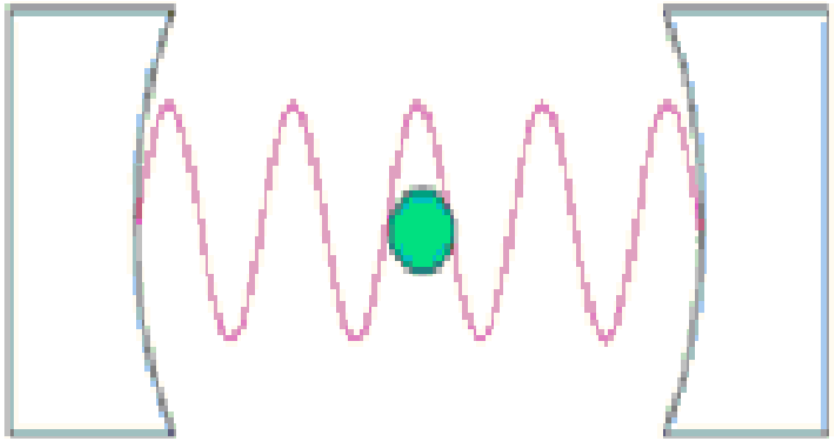
Fluorescence Lifetime

- But the lifetime depends both on emitter and environment!



LDOS

- This is a consequence of the high Local Density of Optical States (LDOS). This represents the number of available energy levels per energy interval.



Effect on Emitters

- The Purcell Effect in a resonant cavity:

$$F_p = \frac{3}{4\pi^2}\left(\frac{\lambda_c}{n}\right)^3\left(\frac{Q}{V}\right)$$

- Photonic Band Gaps in Photonic Crystals

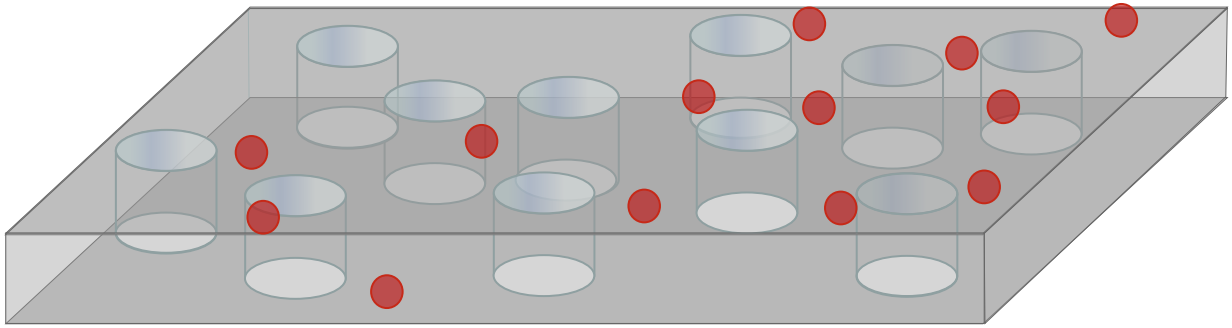
Why is this important?

- Disordered and random media are relatively simple to fabricate

- Cheap and brighter LEDs made in a simple way.

Our Question

- How does tuning the randomness/disorder of the medium influence the lifetime statistics and LDOS of a fluorescent emitter?



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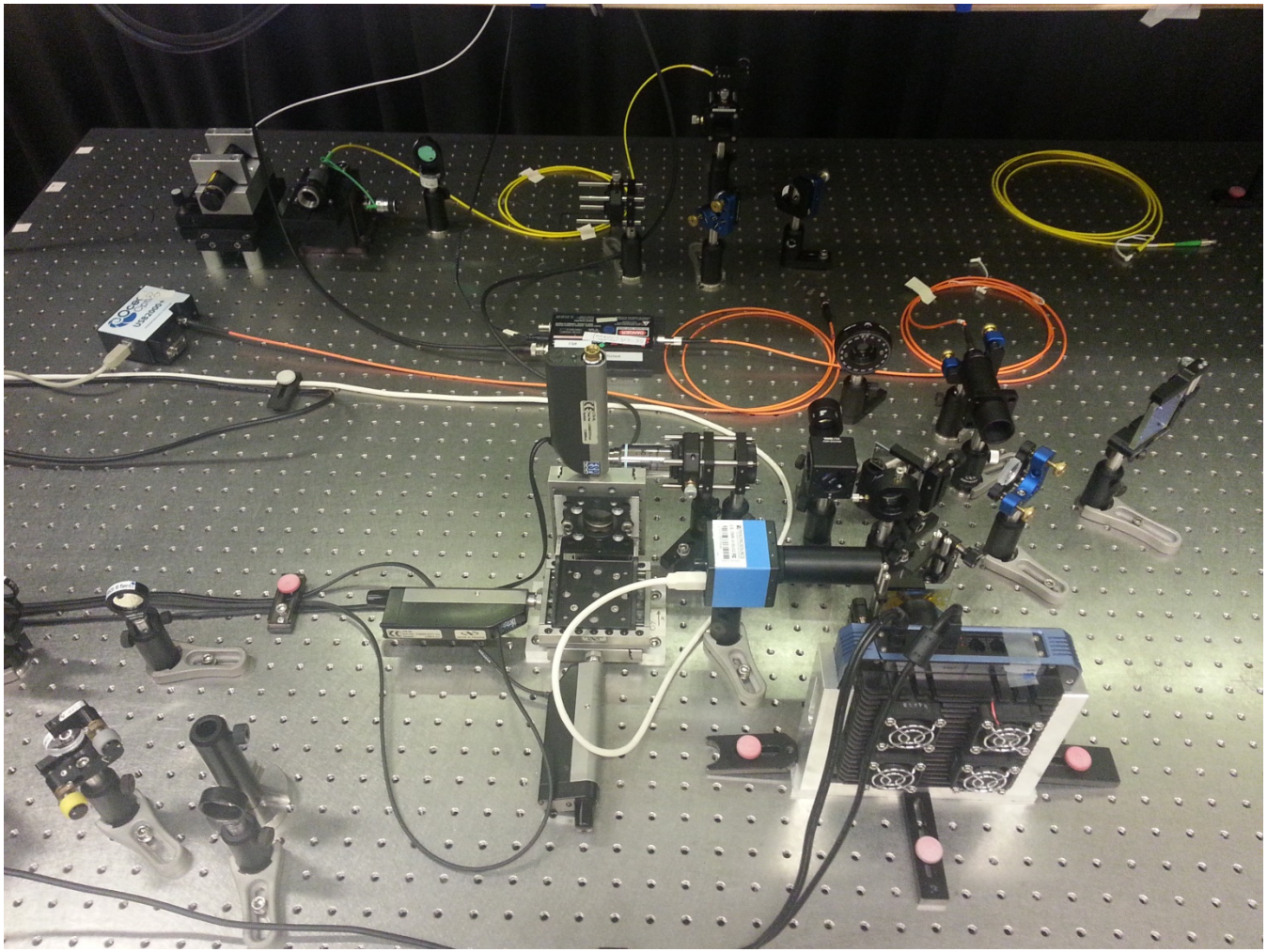
Our Experimental Setup



Current Progress

- Currently working on characterizing lifetime statistics of Quantum Dots.

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Current Progress

- Programming necessary software to allow for a powerful interface between lab equipment and automated measurement

Acknowledgements

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References

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Questions?

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Thank you for your attention!