13.01. R. M. Stevenson, R. J. Young, P. Atkinson, K. Cooper, D. A. Ritchie, and A. J. Shields: *A semiconductor source of triggered entangled photon pairs*, **Nature 439, 179–182 (2006)**

Presenter (10 min):
Sketch the key result.
Bibliometrics: What do you know about the author? Which papers and results does it build on? What are the implications of this result? Is the paper a milestone?

Questions:

1. Explain the quantum emitter and the energy level scheme underlying the experiments in this publication (for the general case $S \neq 0$). Which are the two important energy scales affecting the emission spectra of this level scheme and what is their origin?
2. Which properties of the quantum emitter (level scheme) must be tuned to produce entanglement and why? Which technique(s) were used in this publication for tuning *S*?
3. Which other mechanisms can be used for tuning S (pros/cons?)?
4. Explain the principle of quantum state tomography and the density matrix formalism.
5. How was quantum state tomography implemented in this publication? Explain the photon cross-correlation method for this purpose.
6. Which are quantitative measures of entanglement and which of them were used in this publication?
7. Did the authors make a good choice? Consider/Discuss the following comments on the present paper:
    - https://arxiv.org/pdf/quant-ph/0602018v1.pdf
    - https://arxiv.org/pdf/quant-ph/0601200.pdf
8. Search for record values for QD-based photon-pair entanglement reported in the literature. What are possible limitations?
9. Which applications/implementations were demonstrated using entangled photon pair sources? Summarize them briefly.
10. Which are the biggest challenges in using this type of entanglement source for long-distance quantum communication? To answer the question, explain, which credentials are important for the realization of quantum repeaters.