How to Give Presentations

Peter N. Saeta, 15 September 2020

Maximize Signal-to-Noise

Jean-luc Doumont

How to maximize signal-to-noise?

- Consider what your listeners need to help them focus on the signal (the main points you seek to convey)
- Develop slides to reinforce the story you tell
- Minimize visual and aural distractions

What does the audience need?

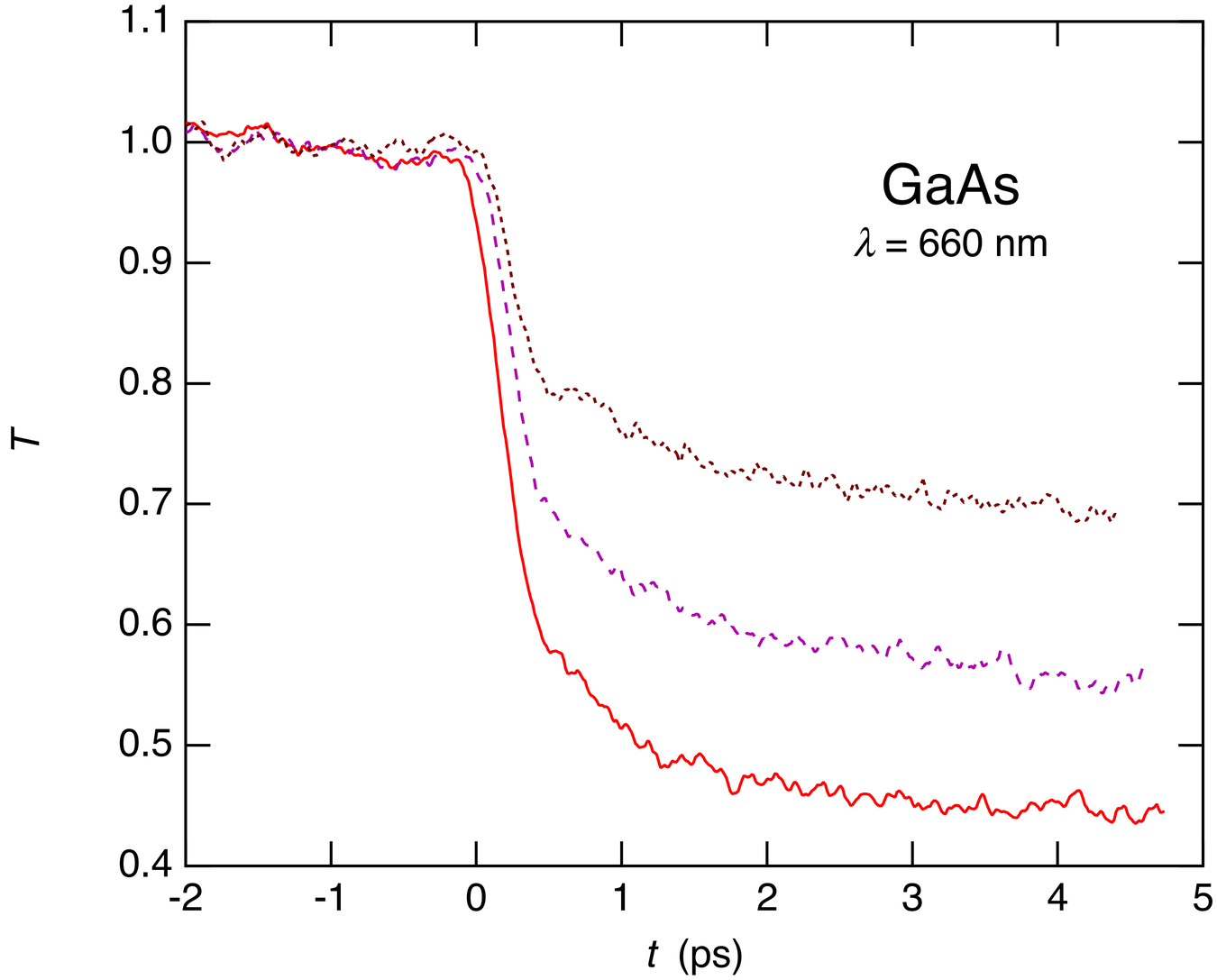
- A hook — why should I pay attention?
- A problem — what is the challenge here?
- A solution — how are you tackling the problem?
- Redundancy — steady reminders of the storyline and key points
- Summary — what should I remember?

How to get started?

- What are the three points you want me to take away?
- Why should I care about what you are talking about?
- What do I need to know to be able to appreciate how cool your work is?
- How will you help me if I get a little lost or behind?
- What visuals will help me understand your points?

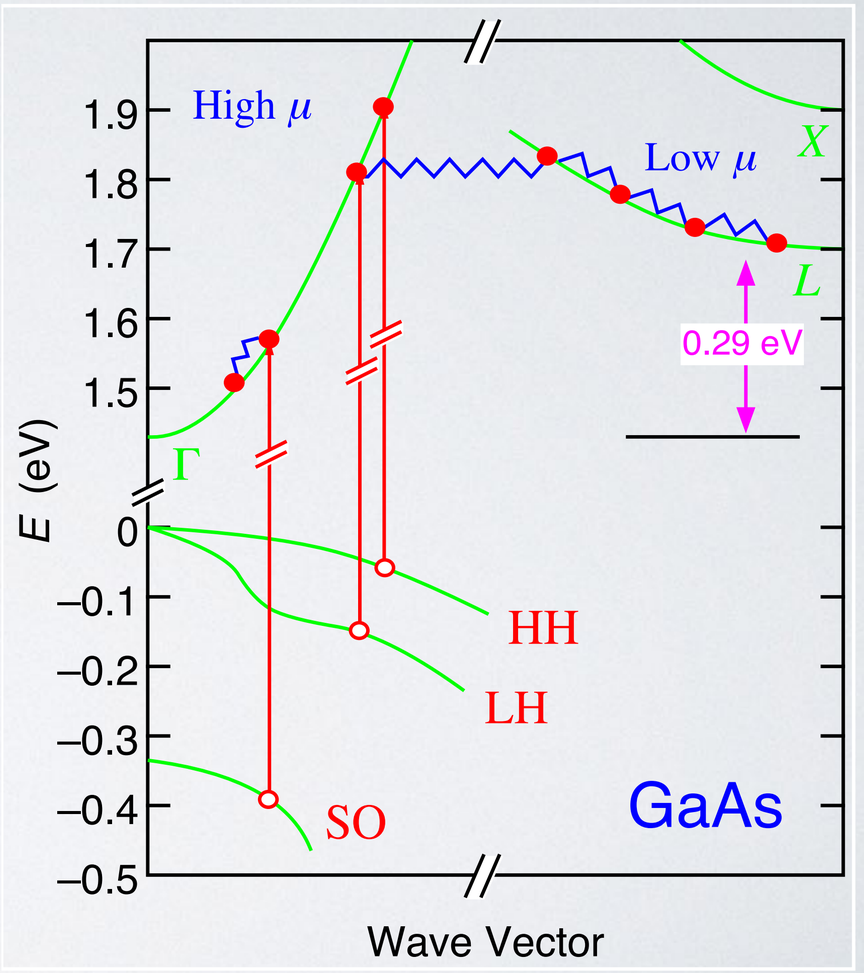
Does this help you?

- Introduction
- Experimental setup
- Results on GaAs
- Results on InP
- Future work
- Conclusions
- Acknowledgments



HOW DOES A SEMICONDUCTOR ABSORB LIGHT?

- Photons have almost no momentum, so they cause "vertical" transitions.
- Excess energy is shed by emitting **phonons** (about 0.2 ps/phonon)
- Direct recombination takes ~1 ns
- Indirect recombination takes longer: 0.1–1 μs



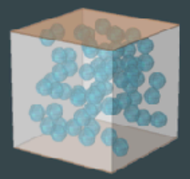
Full Procedure

Fabricate nanoparticle/epoxy composite

Measure the capacitance of composite

ε_{comp}

Determine dielectric constant for composite



COMSOL modeling for various nanoparticle dielectric constants

Calculate dielectric constant for composite

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ε_{BTO}

Compare simulated and measured composite dielectric constants and infer dielectric constant of the BTO nanoparticles

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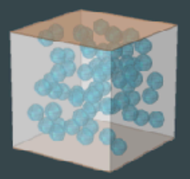

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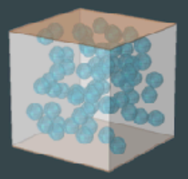

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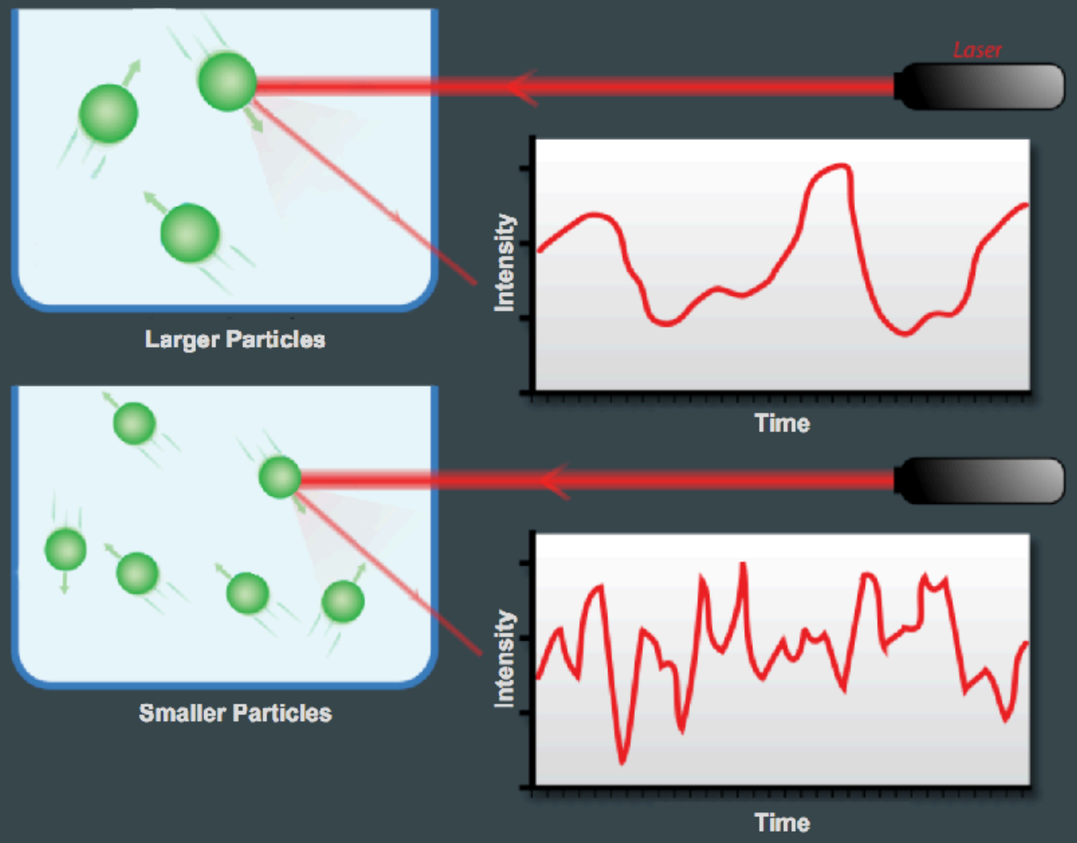
Titles should answer “so what?”, not “what?”

Dynamic Light Scattering



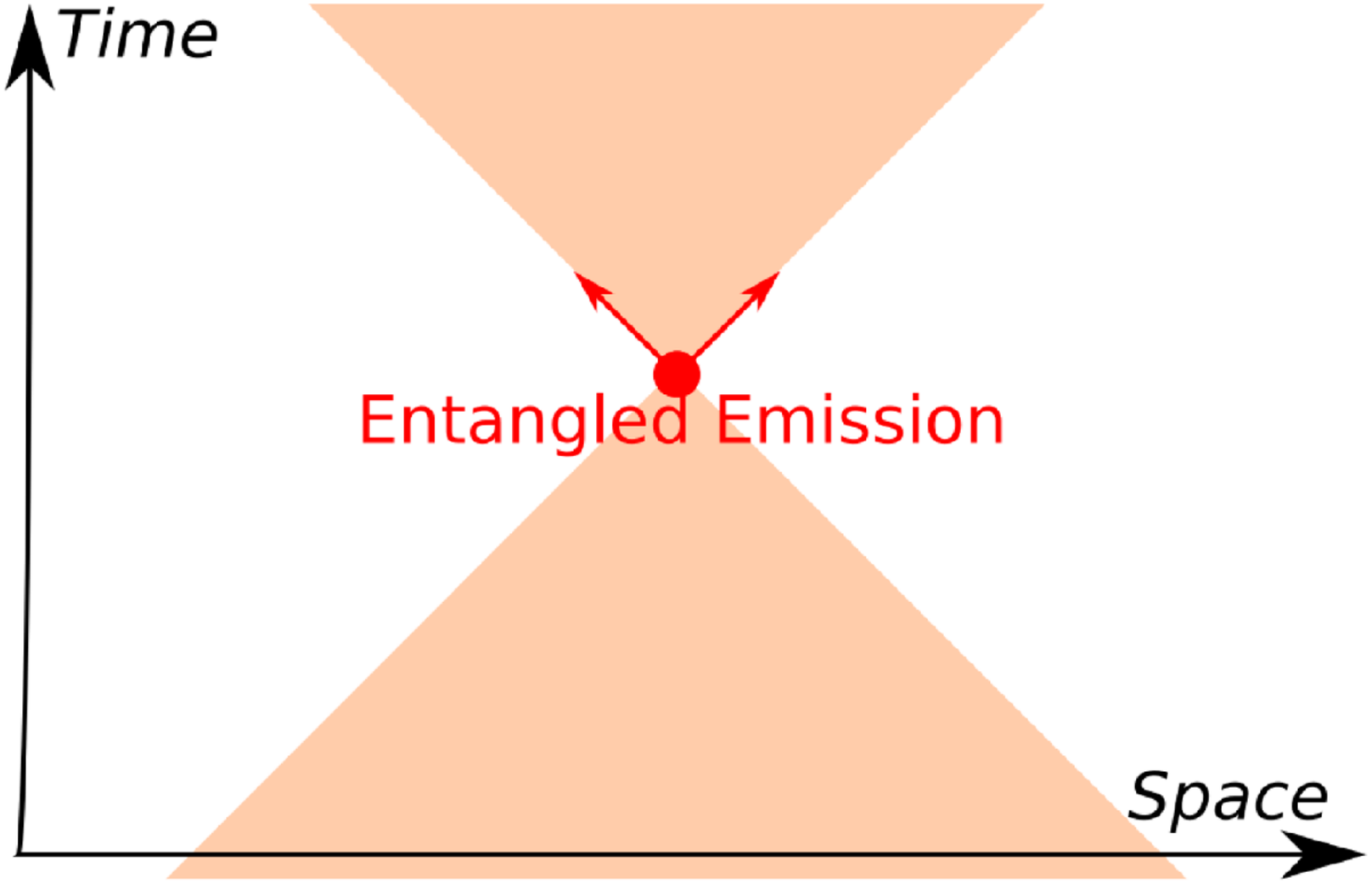
$$D = k_B T / 6\pi\eta r$$

D = diffusion constant
k_B = Boltzmann’s constant
T = absolute temp
η = dynamic viscosity
r = particle radius

Maximize signal-to-noise

- Eliminate unneeded items on slides
- Use readable and consistent fonts
- Use color consistently and intentionally
- Use builds to focus attention on new information
- Avoid “nifty” transition effects, graphical explosions, dancing letters, …
- Integrate the outline to orient audience throughout the presentation
- Provide references to important background

Example build from the Apker-winning presentation of Calvin Leung (’17)



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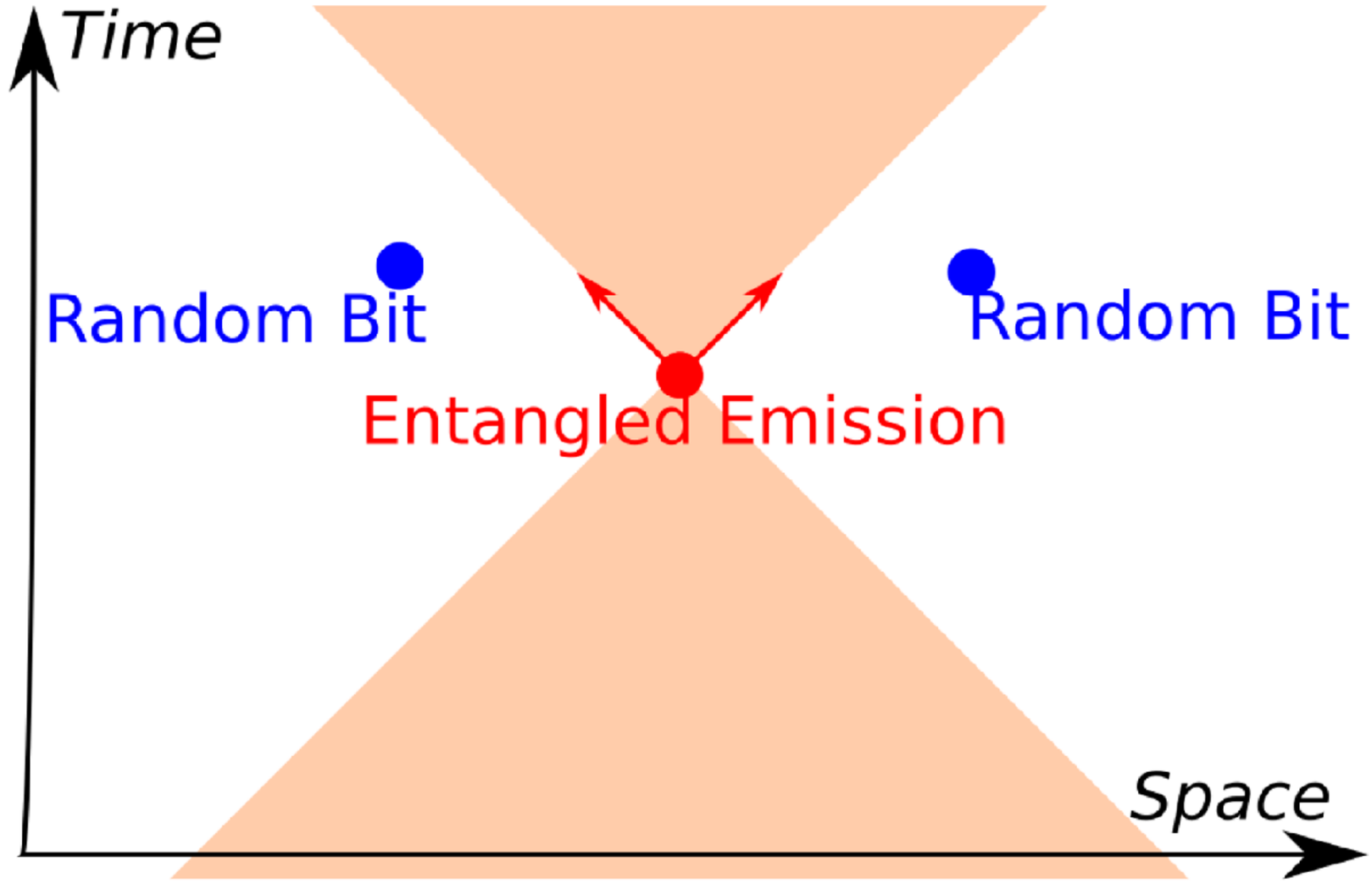

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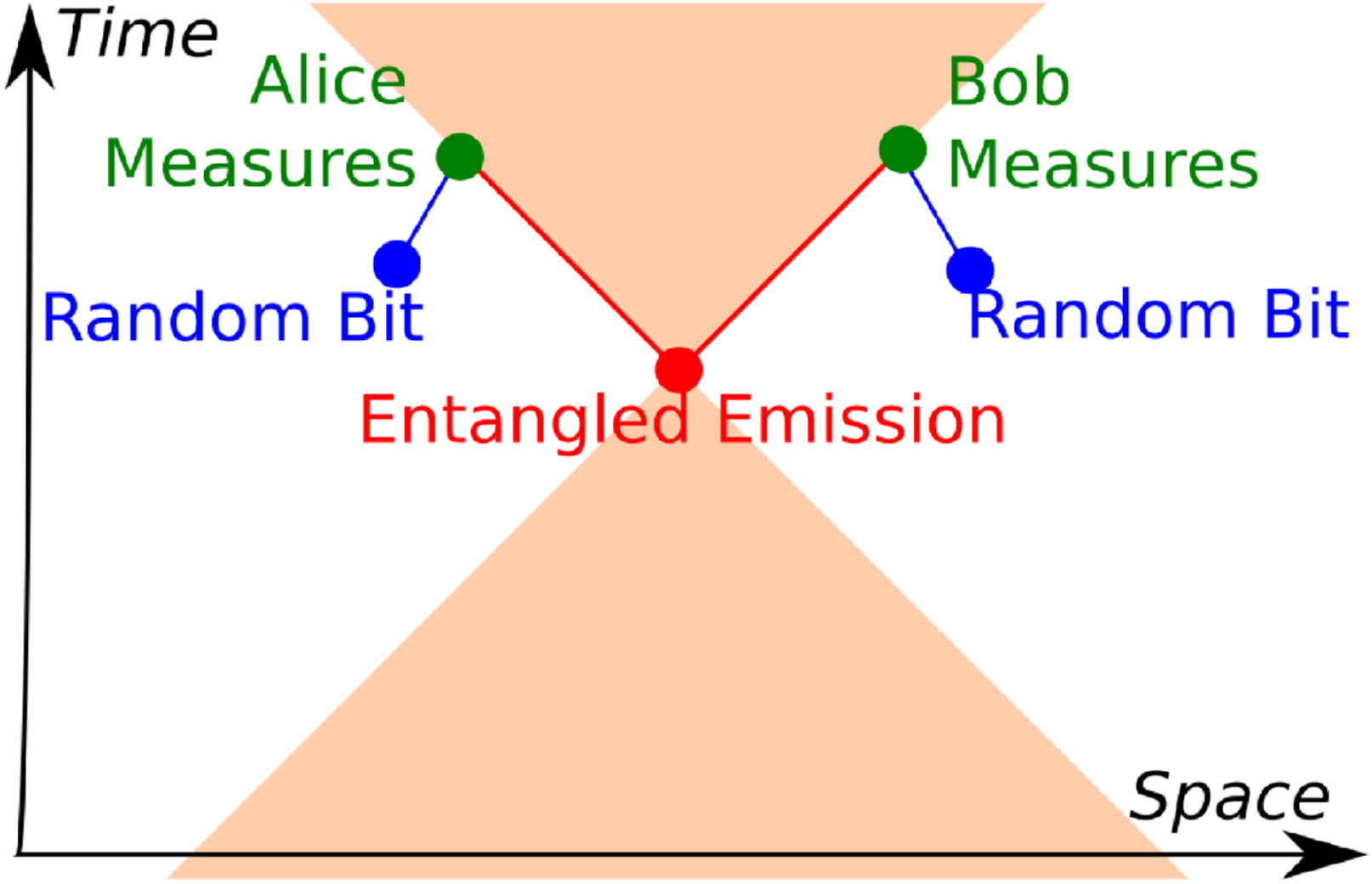

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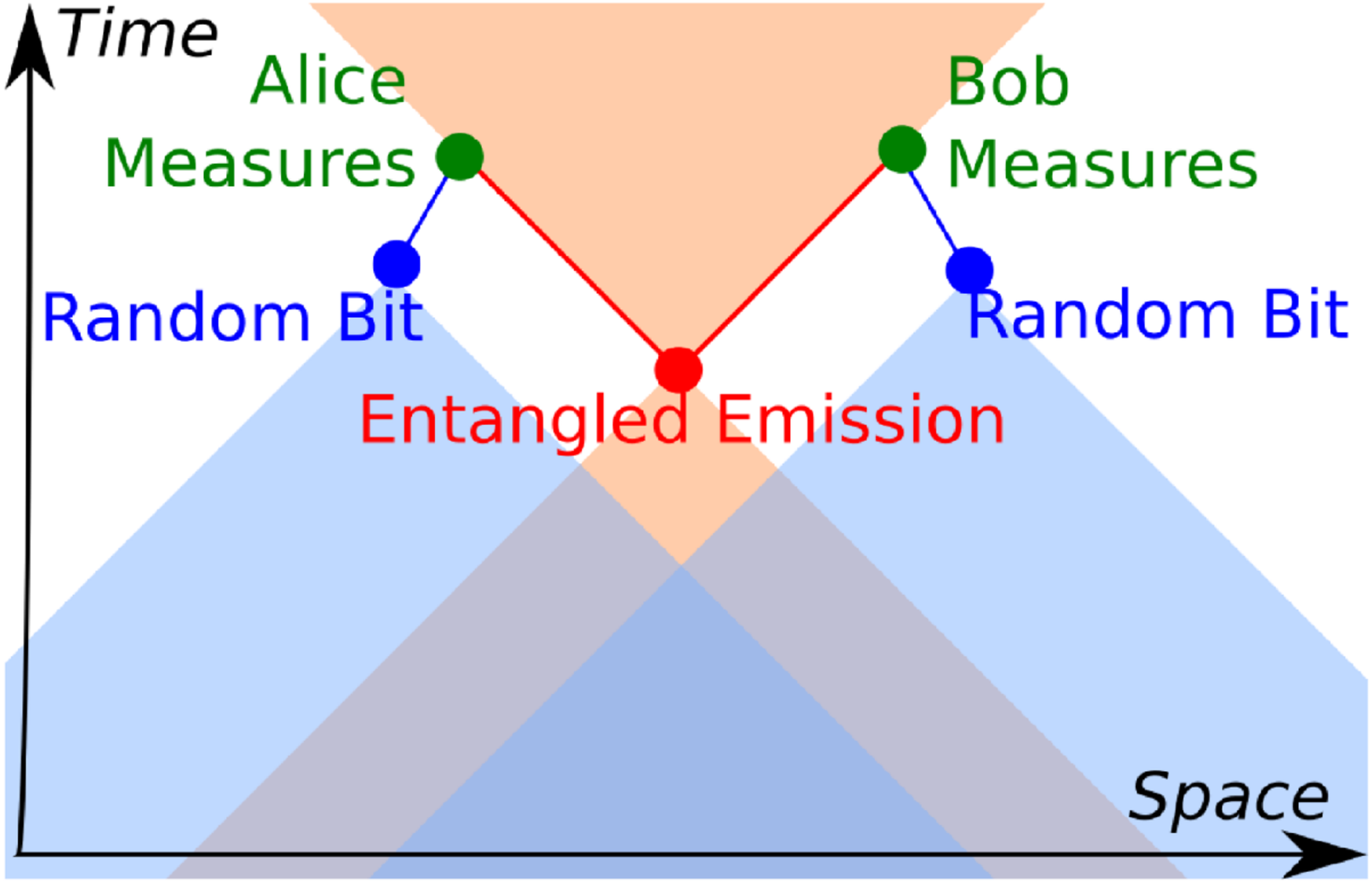

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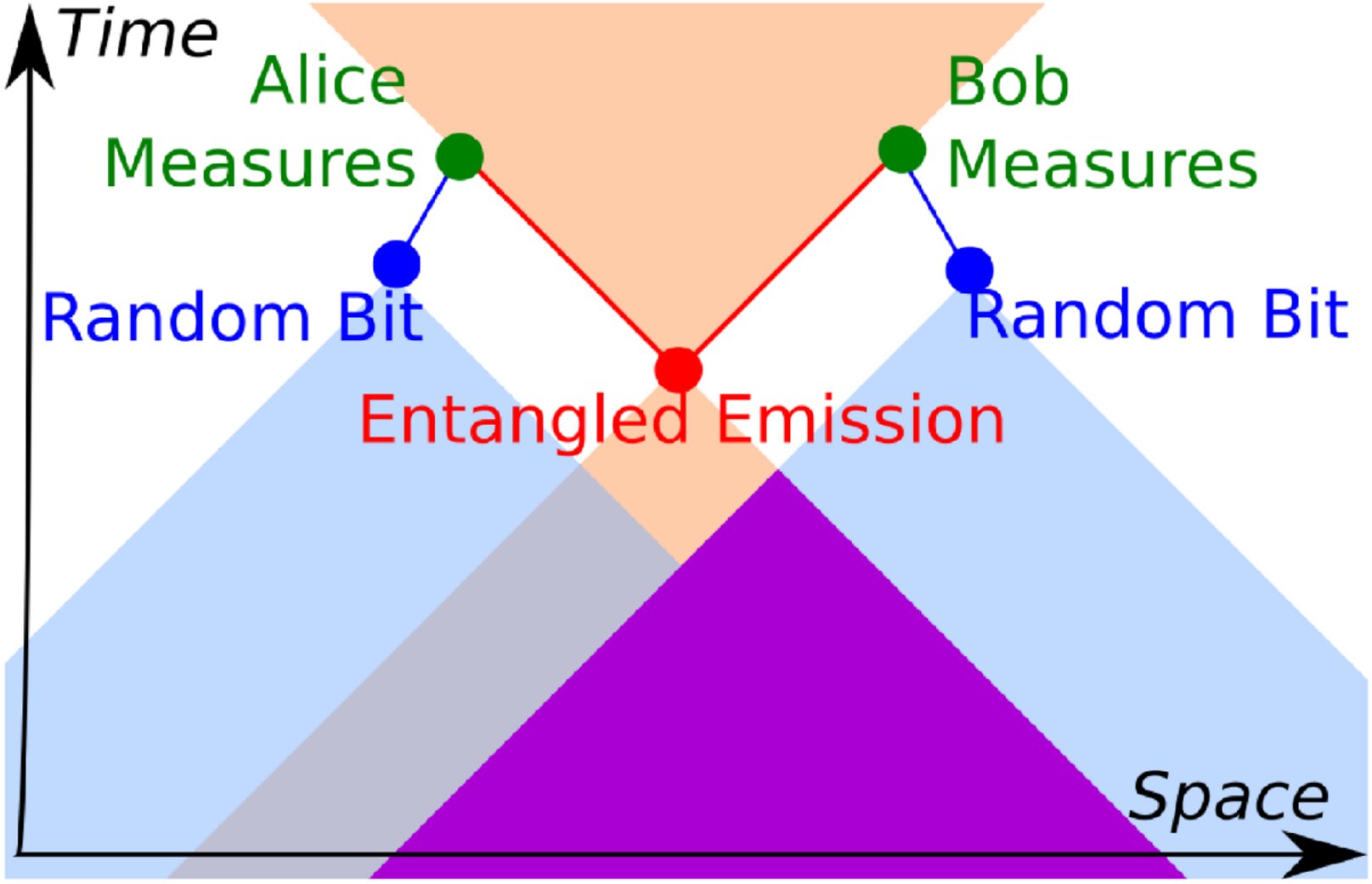

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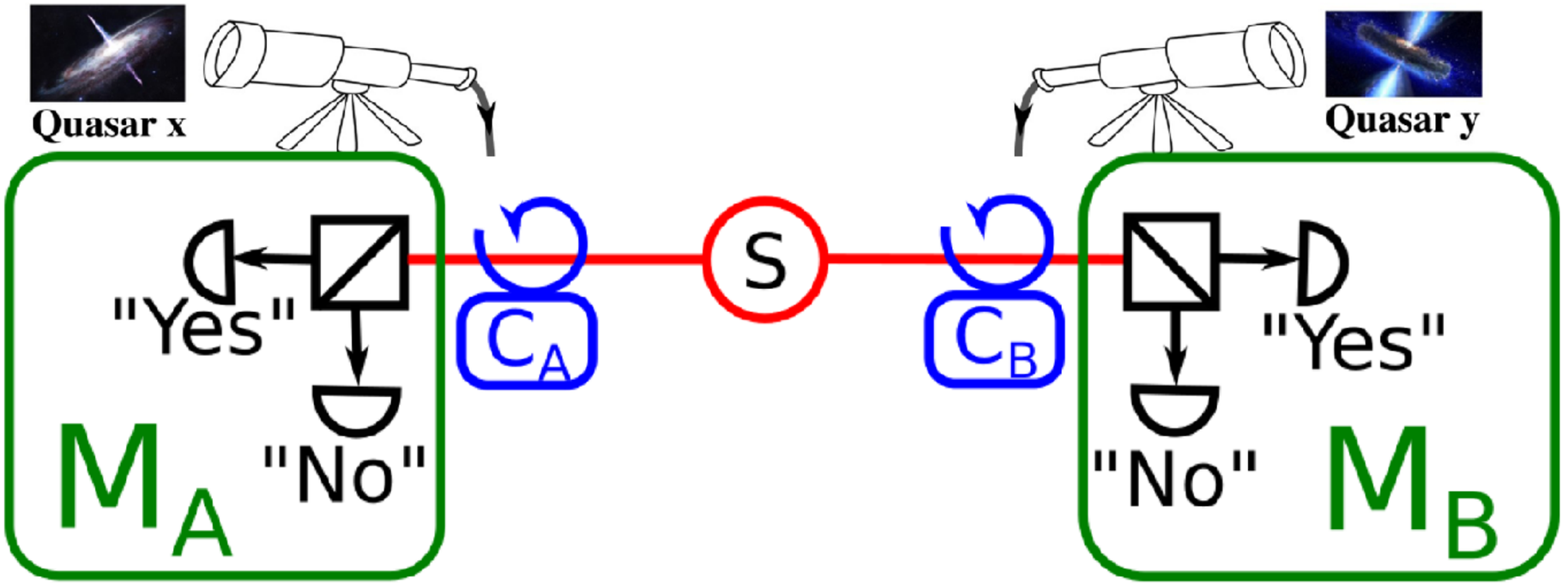
Use Astronomical Randomness to Make Bases Choices



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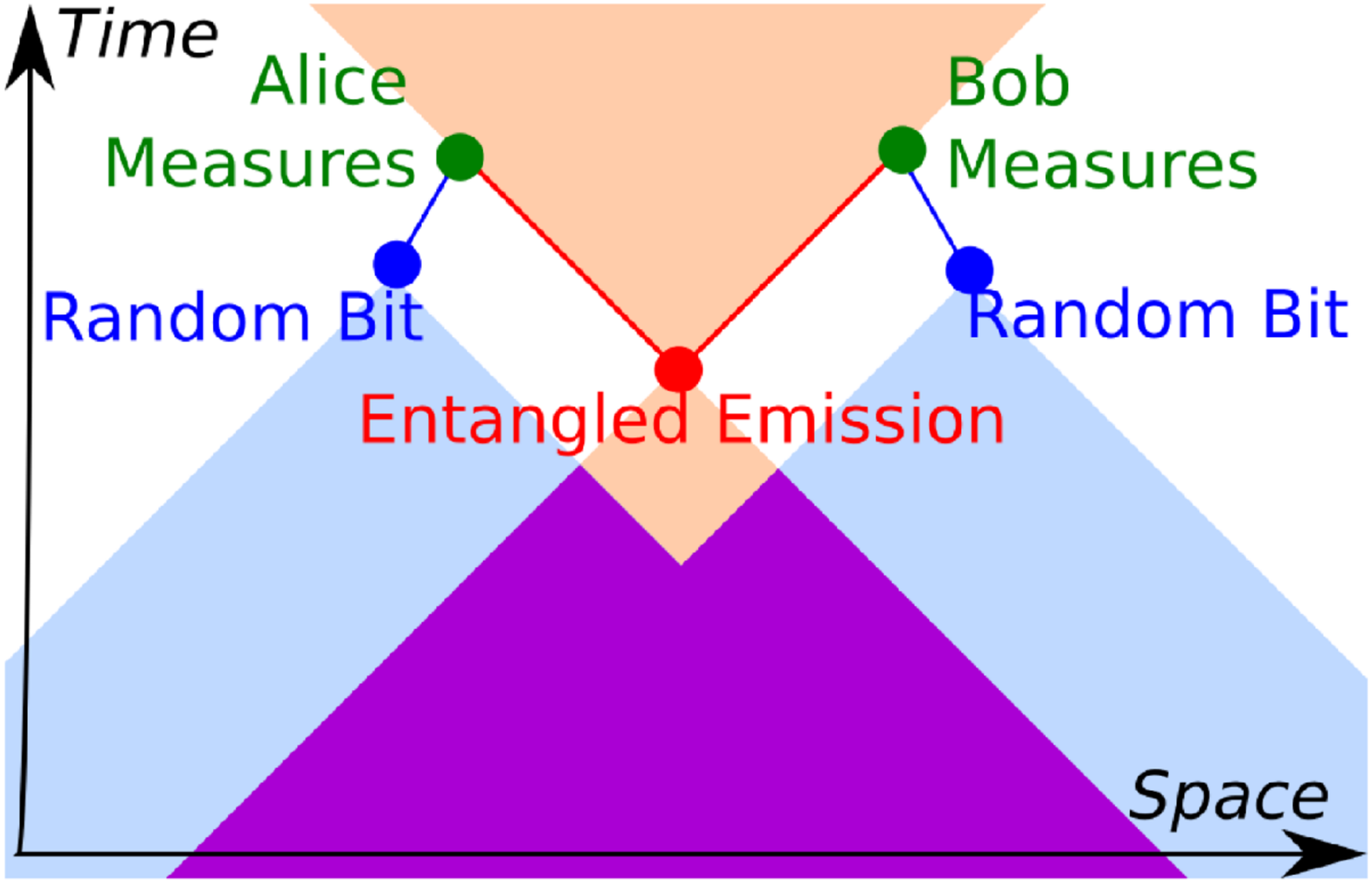

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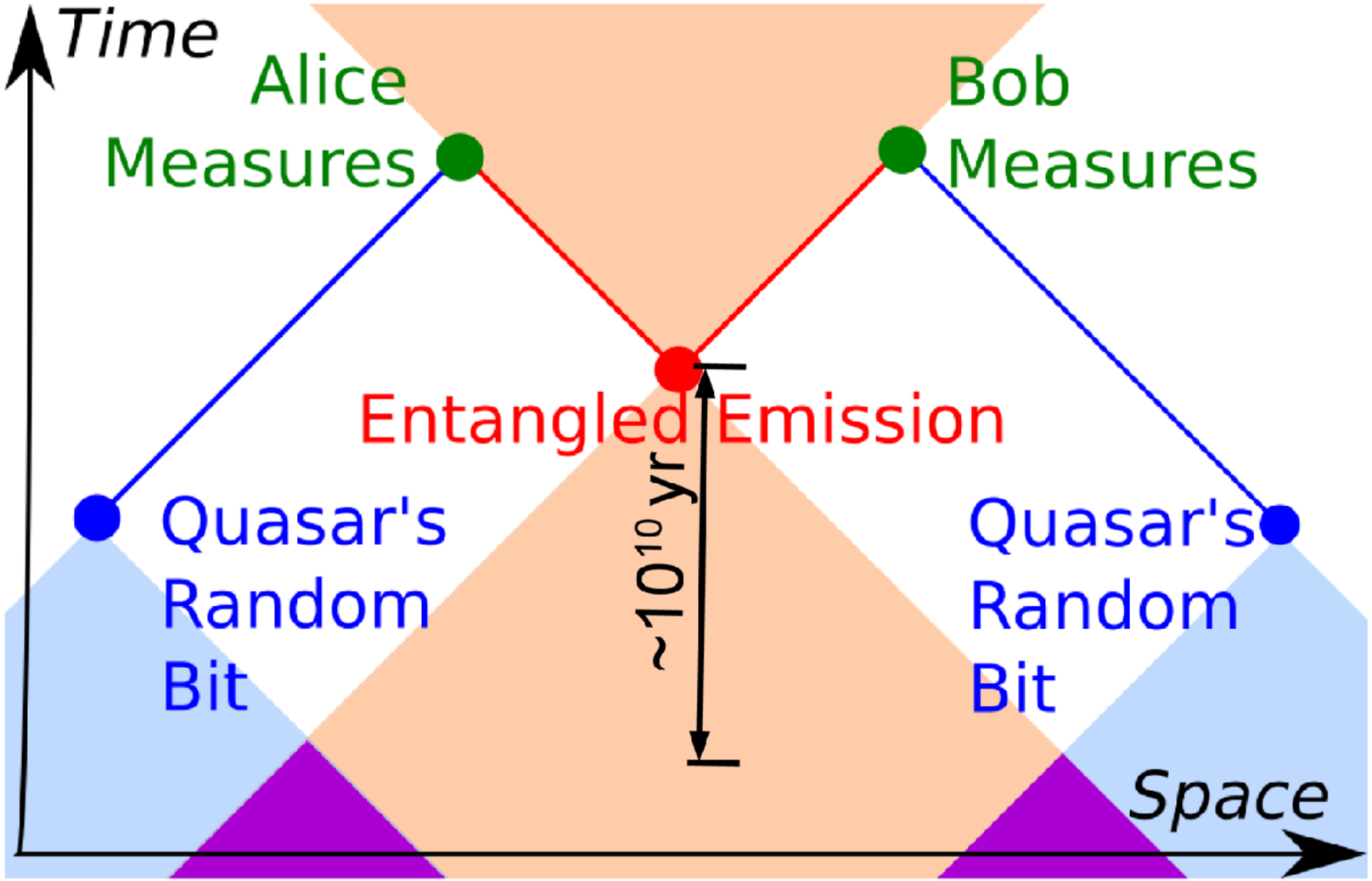
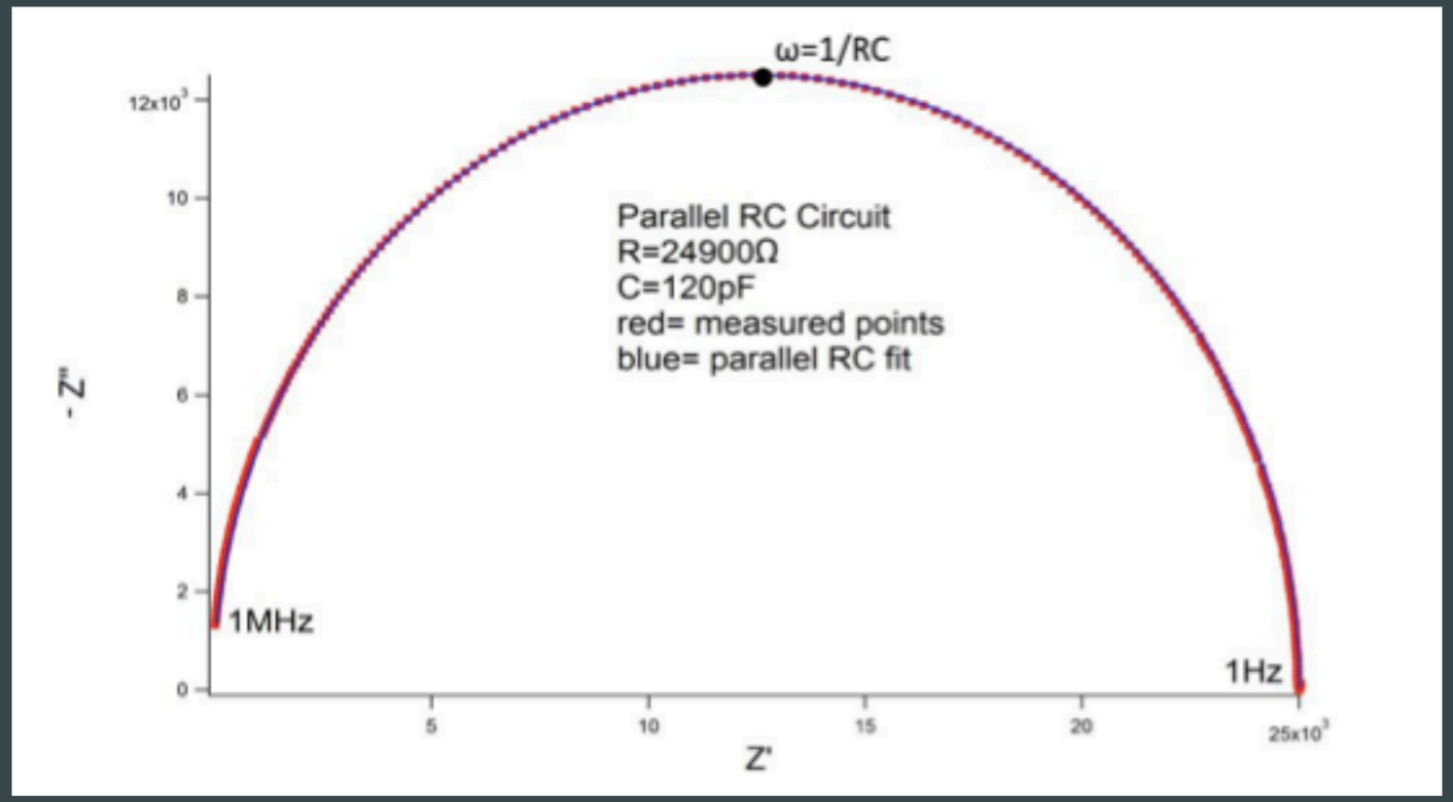
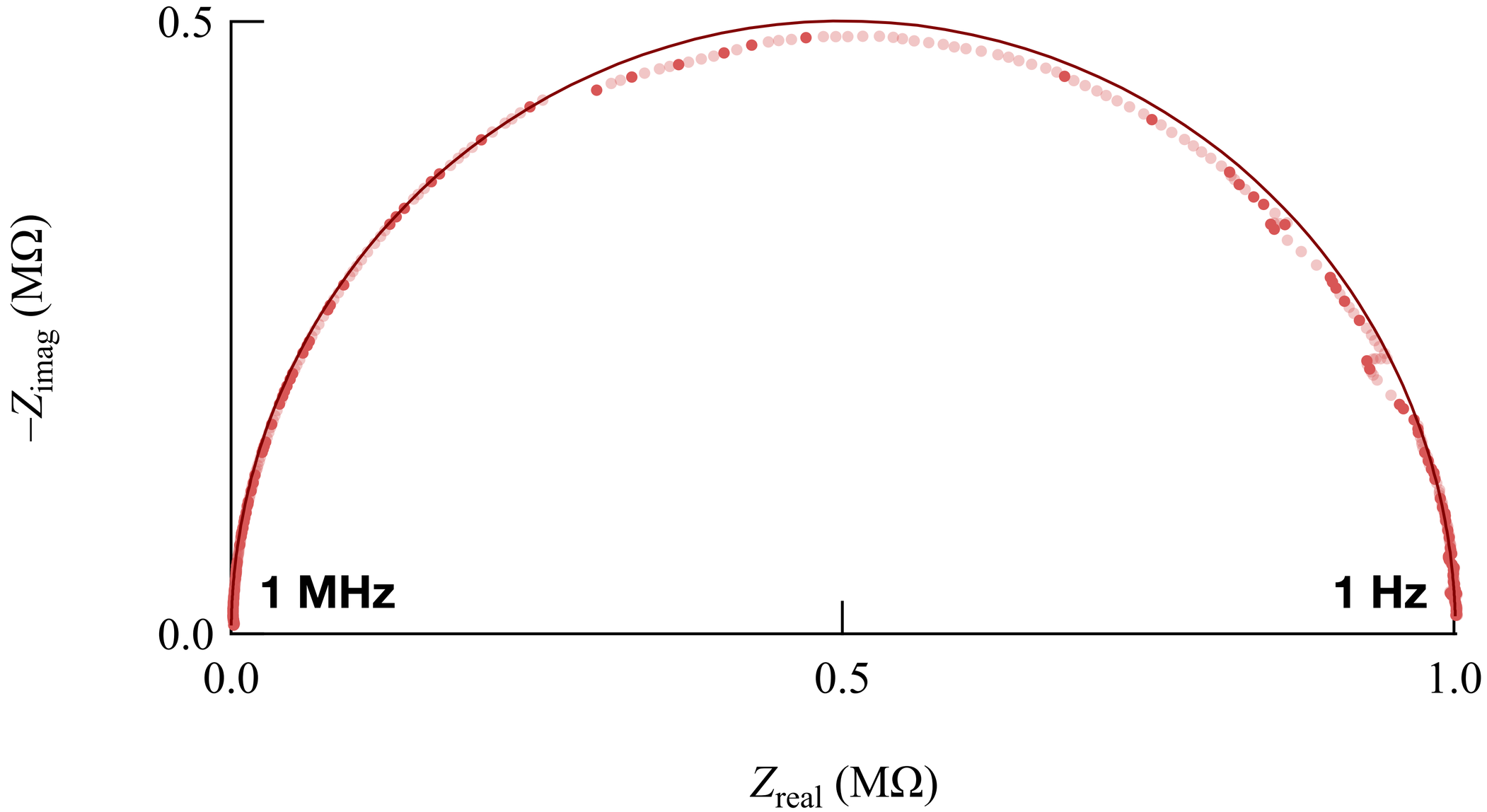


How could you improve this “Nyquist Plot”?

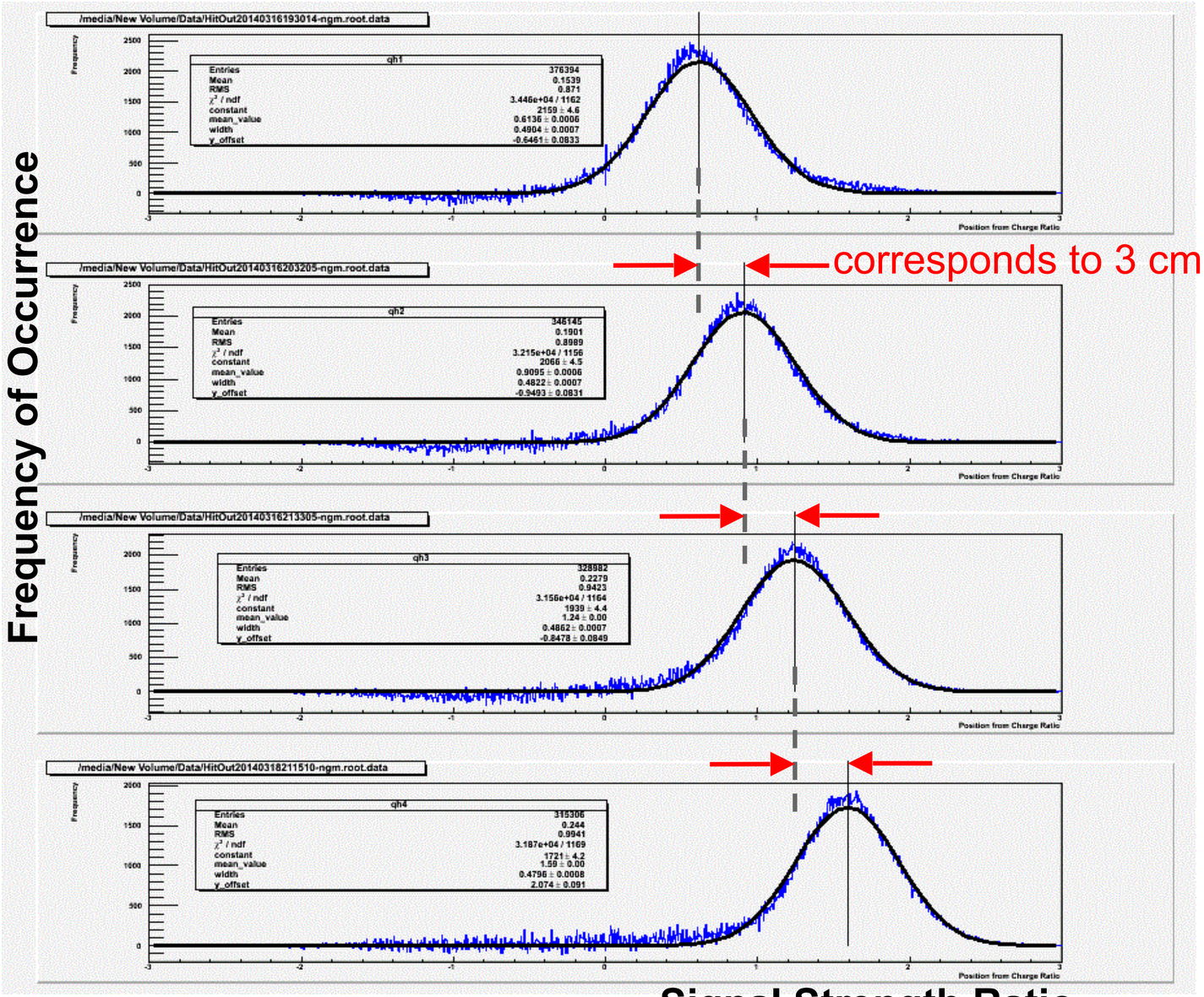
Nyquist Plot



Semicircle → C independent of ω



Position Calibration Results



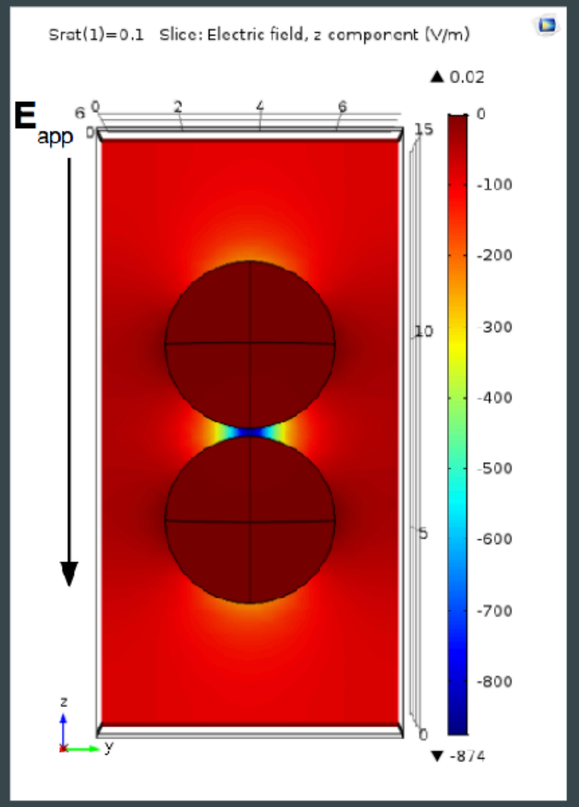
Preliminary Measurements: 200 nm BTO-Epoxy Composites

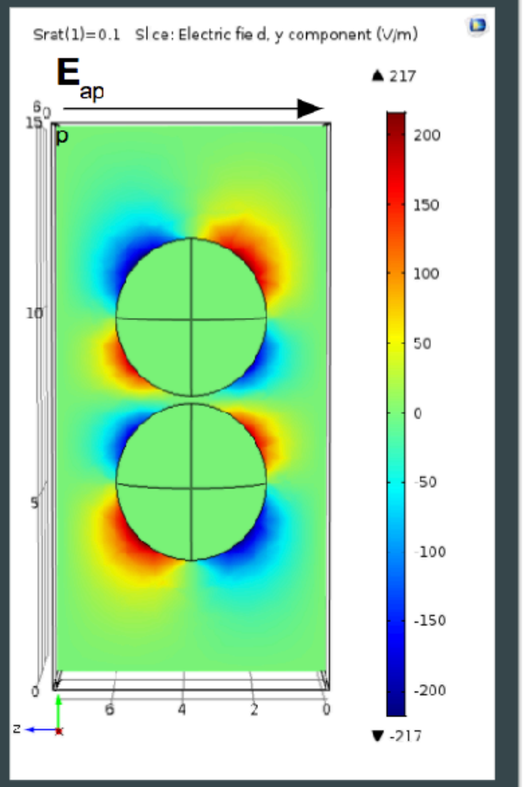
Sample #	Mean Capacitance (pF) N = 5	Diameter (m)	Mean Thickness (m)	**Dielectric Constant**
1	6.48	0.0197612	0.0038481	9.18E+00
2	6.58	0.0197358	0.0039624	9.63E+00
3	6.22	0.019685	0.0040132	9.26E+00
4	7.42	0.0196596	0.003429	9.47E+00
5	6.64	0.0197866	0.0037084	9.04E+00

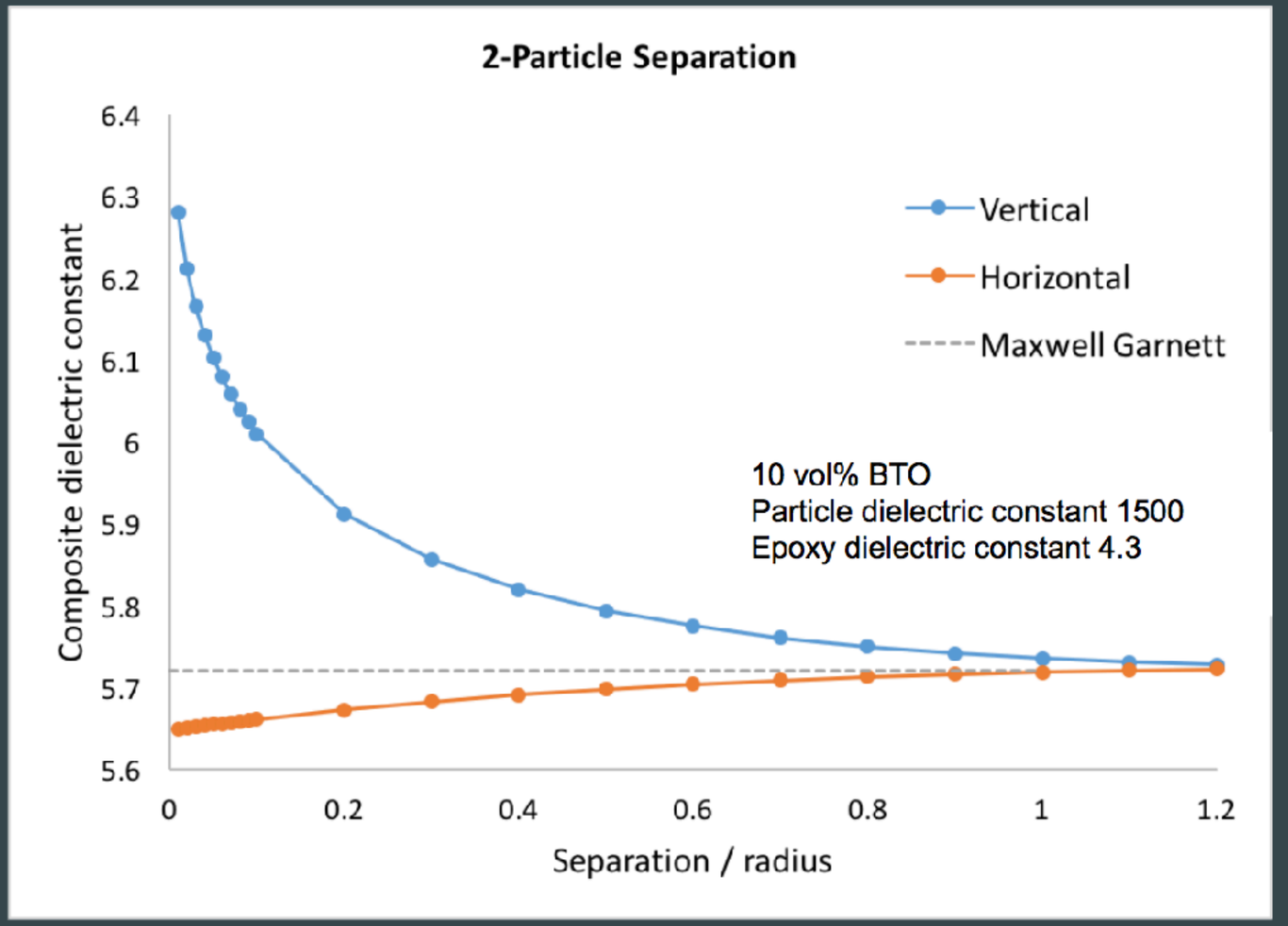
	Mean Dielectric Constant	Std. Error of Dielectric Constant
2016-2017 Team	9.3	0.1
2015-2016 Team	7.3	0.1

$$\varepsilon_r = Cd/A\varepsilon_0$$

Two-Particle Model







Vertical

Horizontal

Effective delivery

- Know the room and the equipment
- Look at the audience; don’t read your slides
- Don’t fidget
- Speak clearly
- Avoid jargon and acronyms as much as possible
- Modulate your voice and pace to supply emphasis
- Eliminate verbal tics; silence can be golden
- Repeat/rephrase questions before answering

practice, practice, practice

To maximize signal-to-noise…

- Consider audience needs — what is the bigger problem?
- Focus on the message not the details — what 1–3 points to take away?
- Minimize visual and aural noise — eliminate unnecessary graphics, text, tics
- Use redundancy to emphasize the storyline