Bringing the Awesomeness of Astronomy to Everyone:

How to give a great public talk

for fun ~~and profit~~

Rachael Livermore

Why give public talks?

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Points to consider when giving public talks

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- Science content

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- Interacting with your audience
- The Q&A
- General presentation habits (apply to research talks too!)

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- You cannot underestimate your audience’s background knowledge!

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  (See also: “What came before the Big Bang?” “What is the Universe expanding into?”

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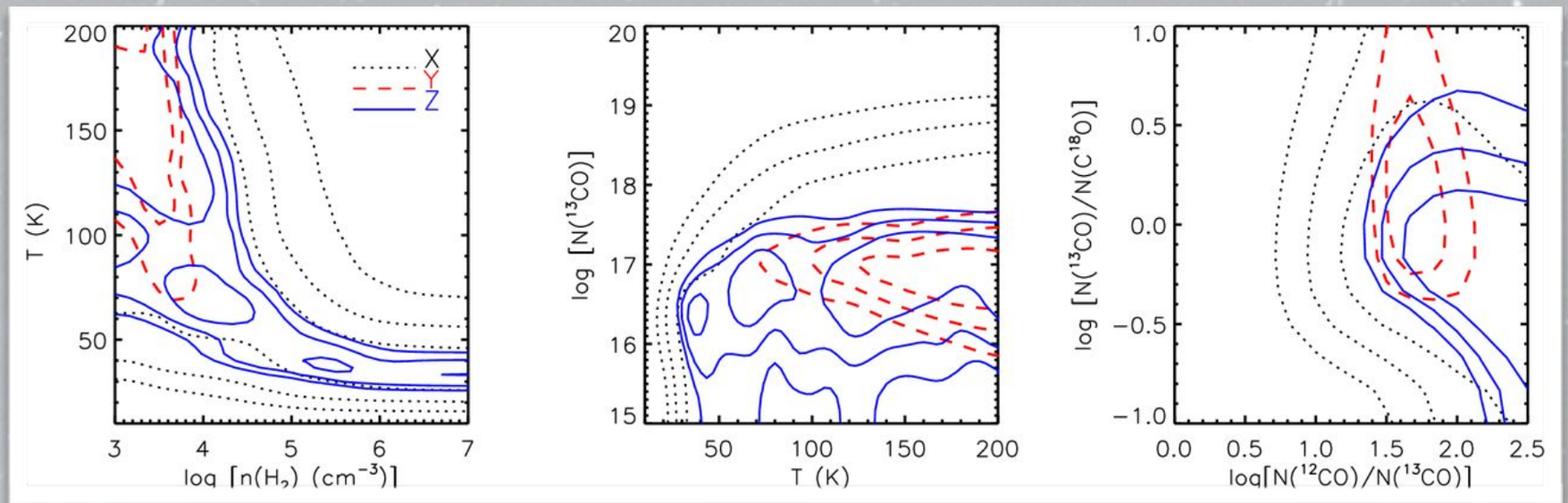
- Memorise your take-home message

Using plots in talks



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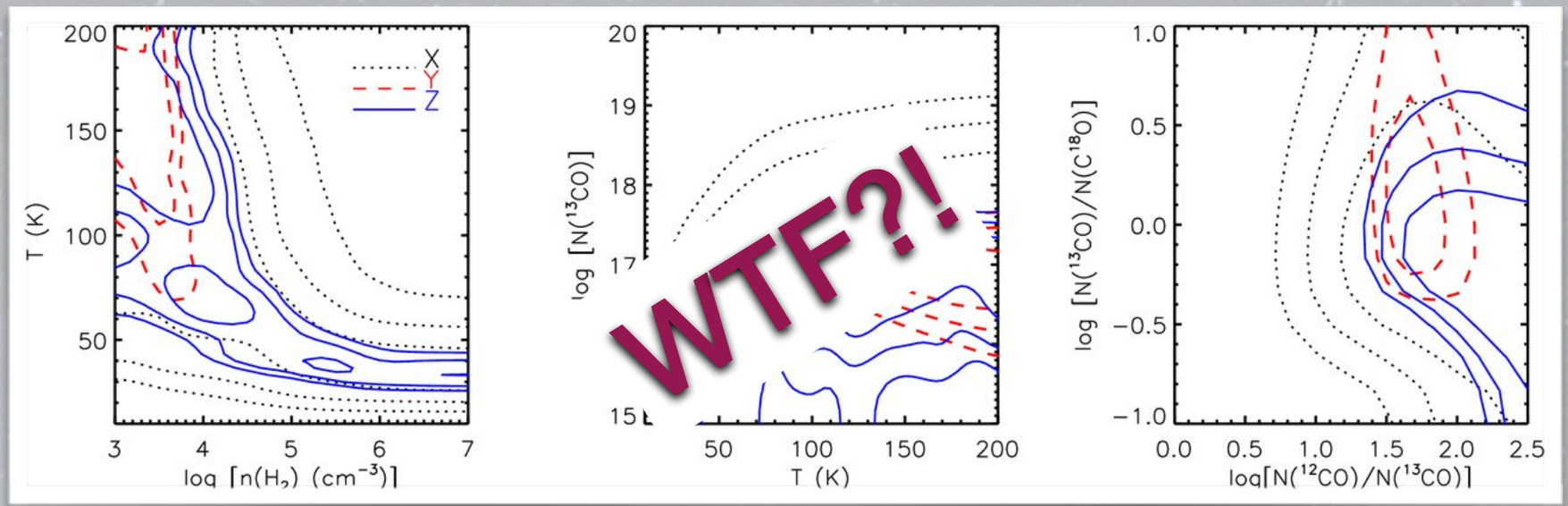

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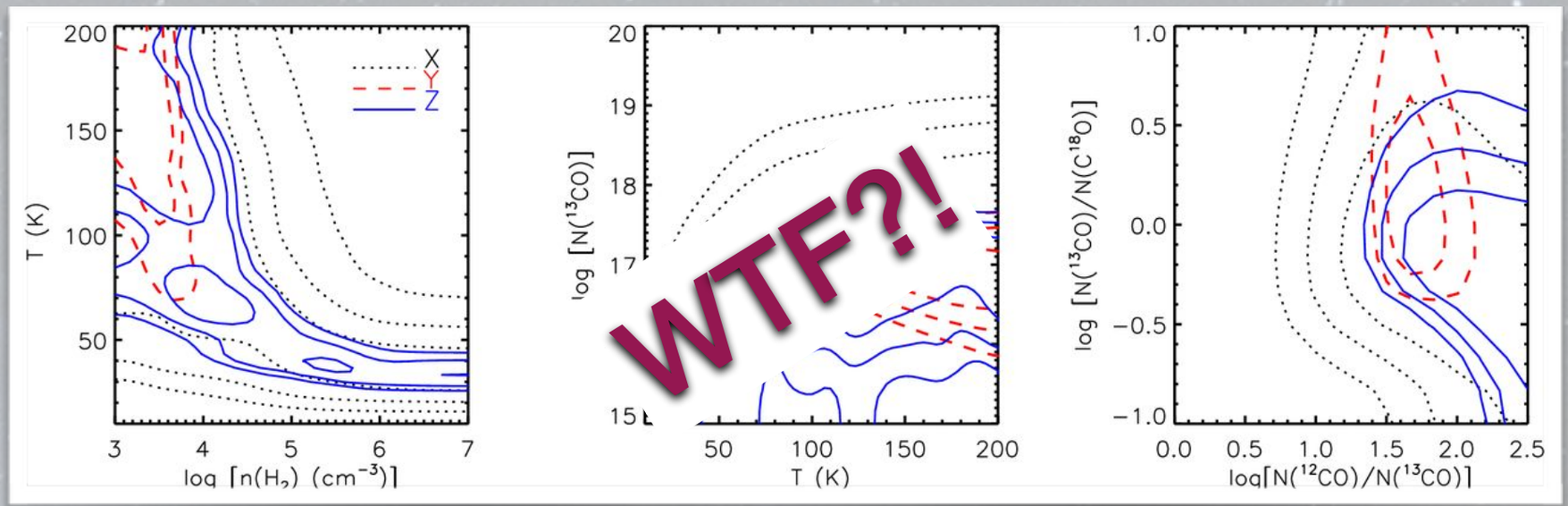

(No offense to Alice Danielson, who includes a perfectly reasonable explanation of this plot in her caption)

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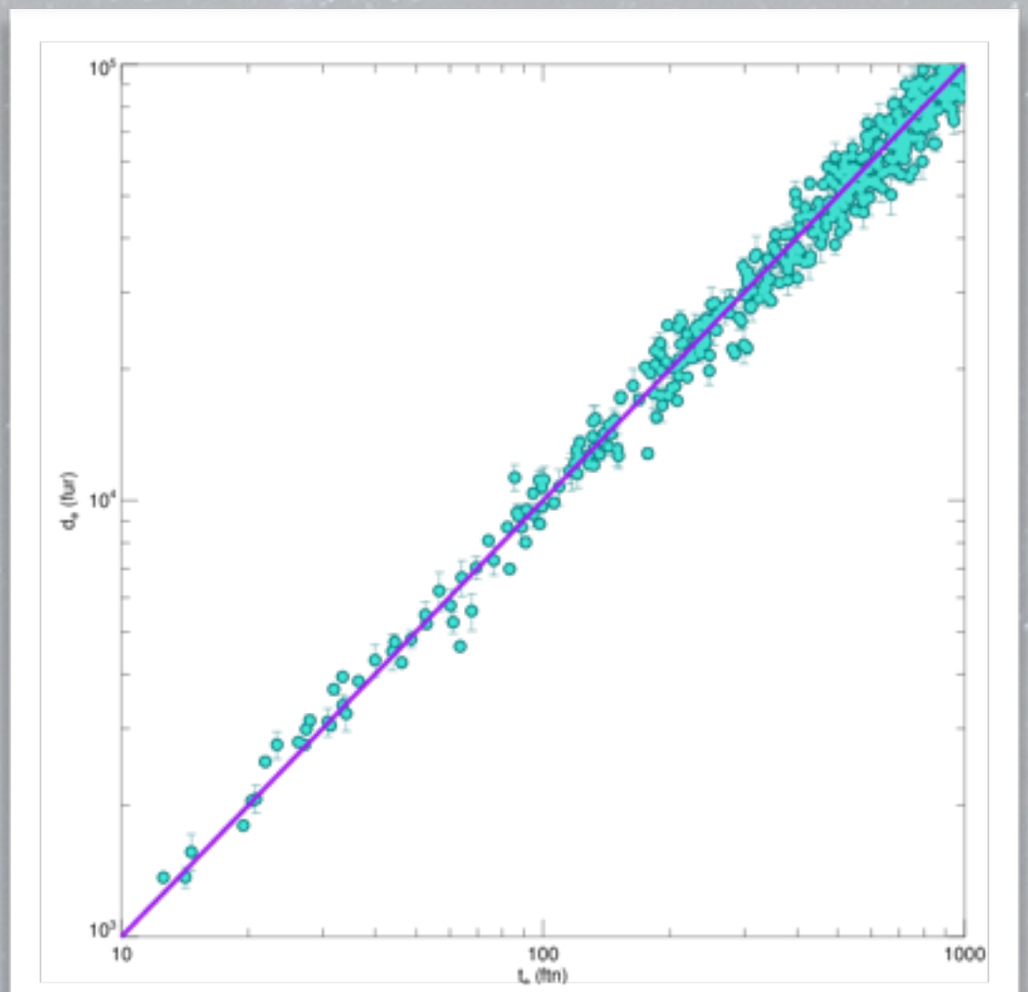

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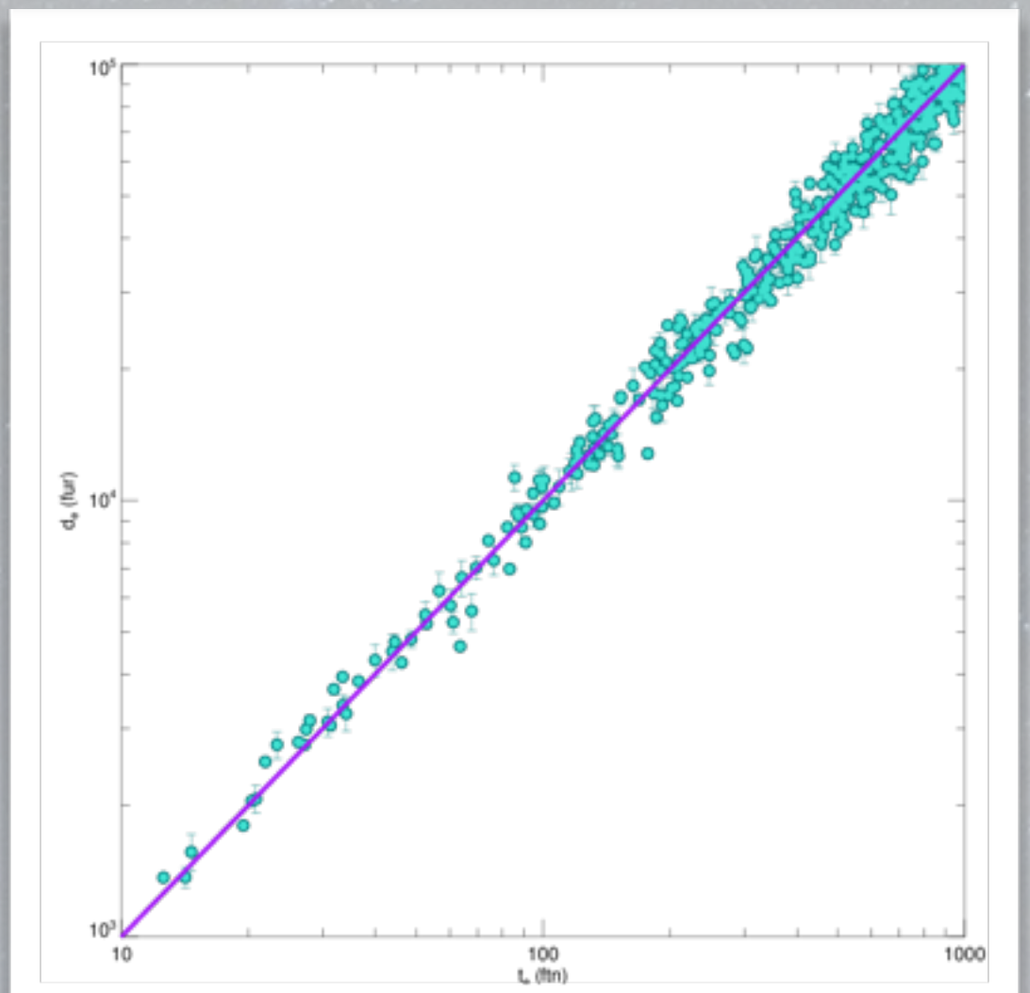

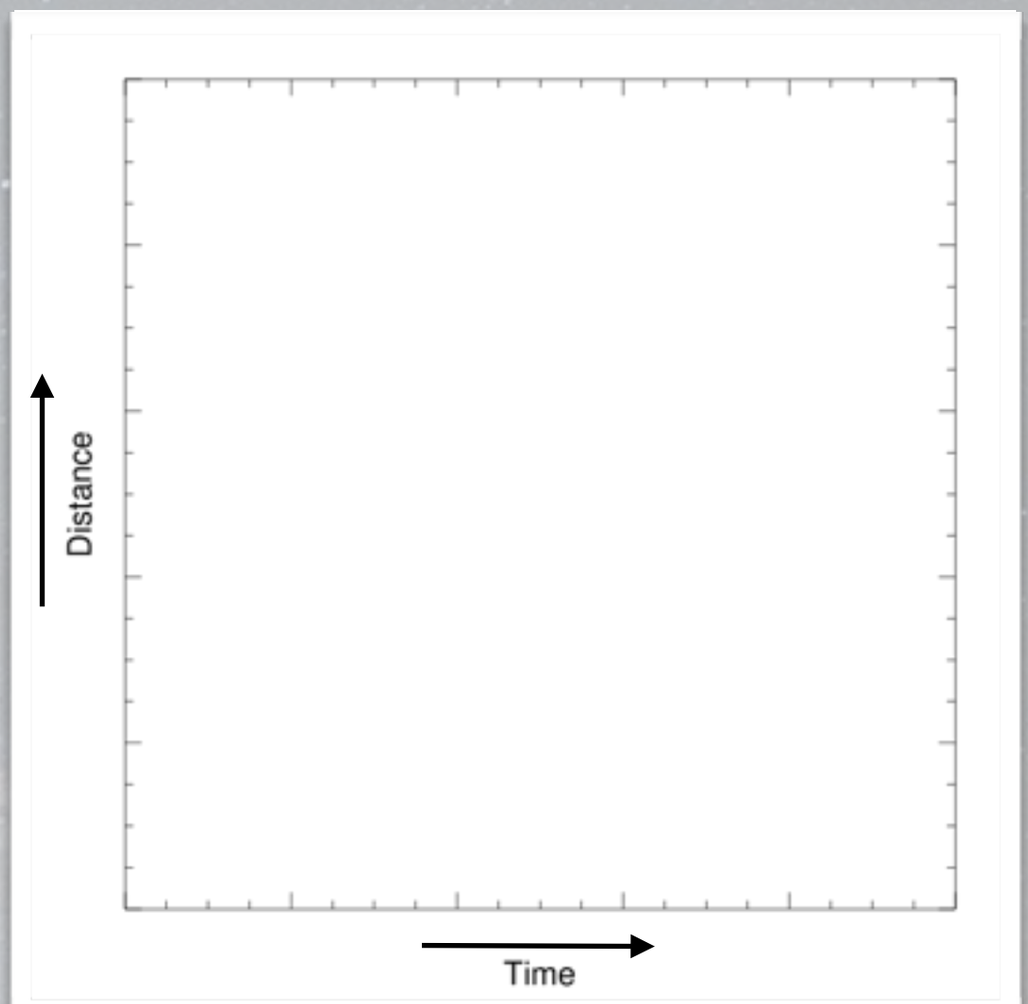

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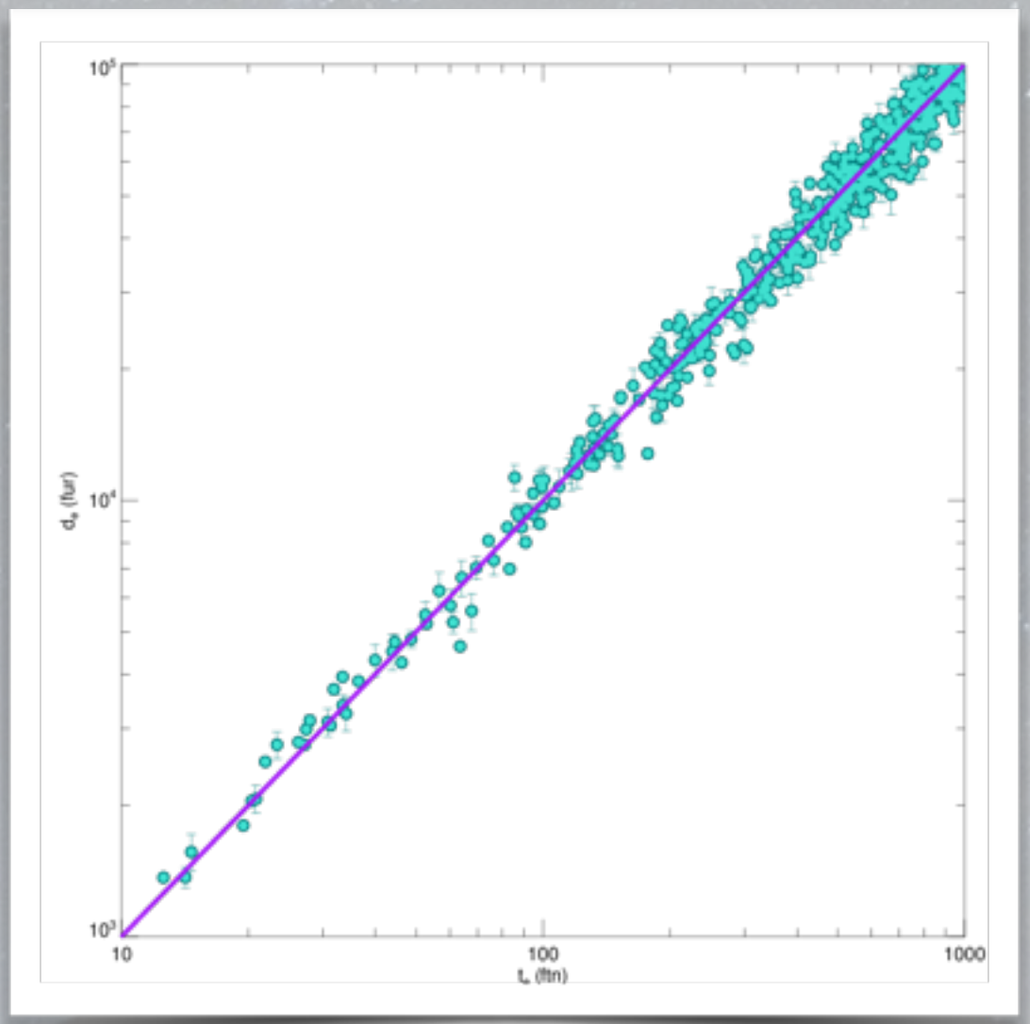

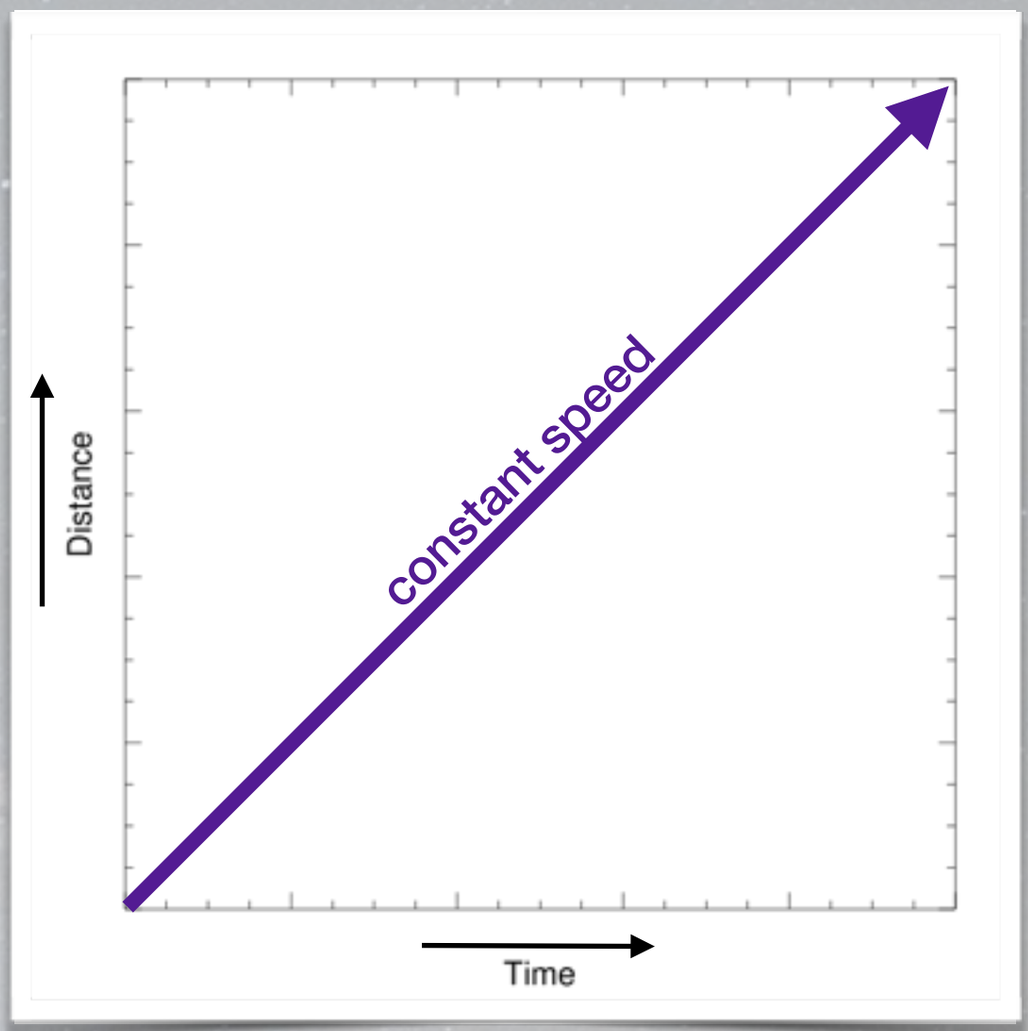

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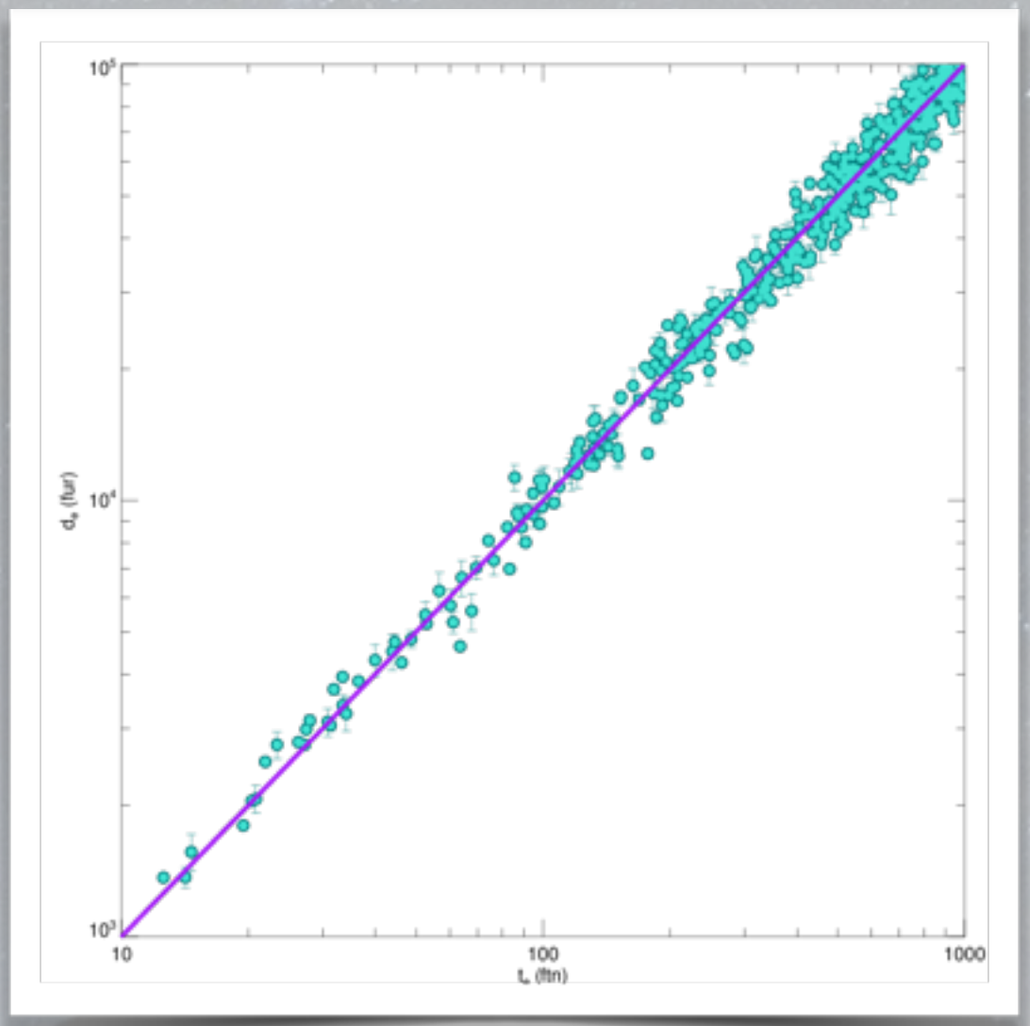

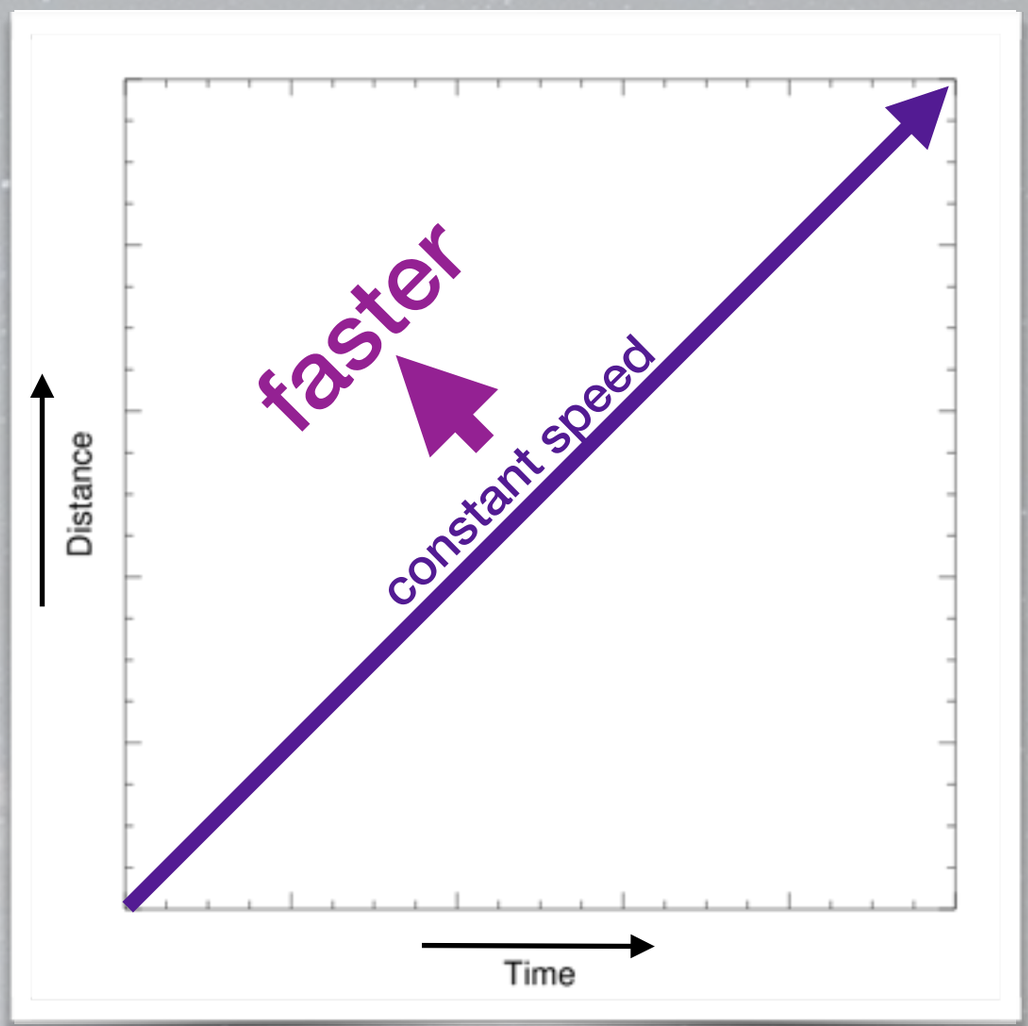

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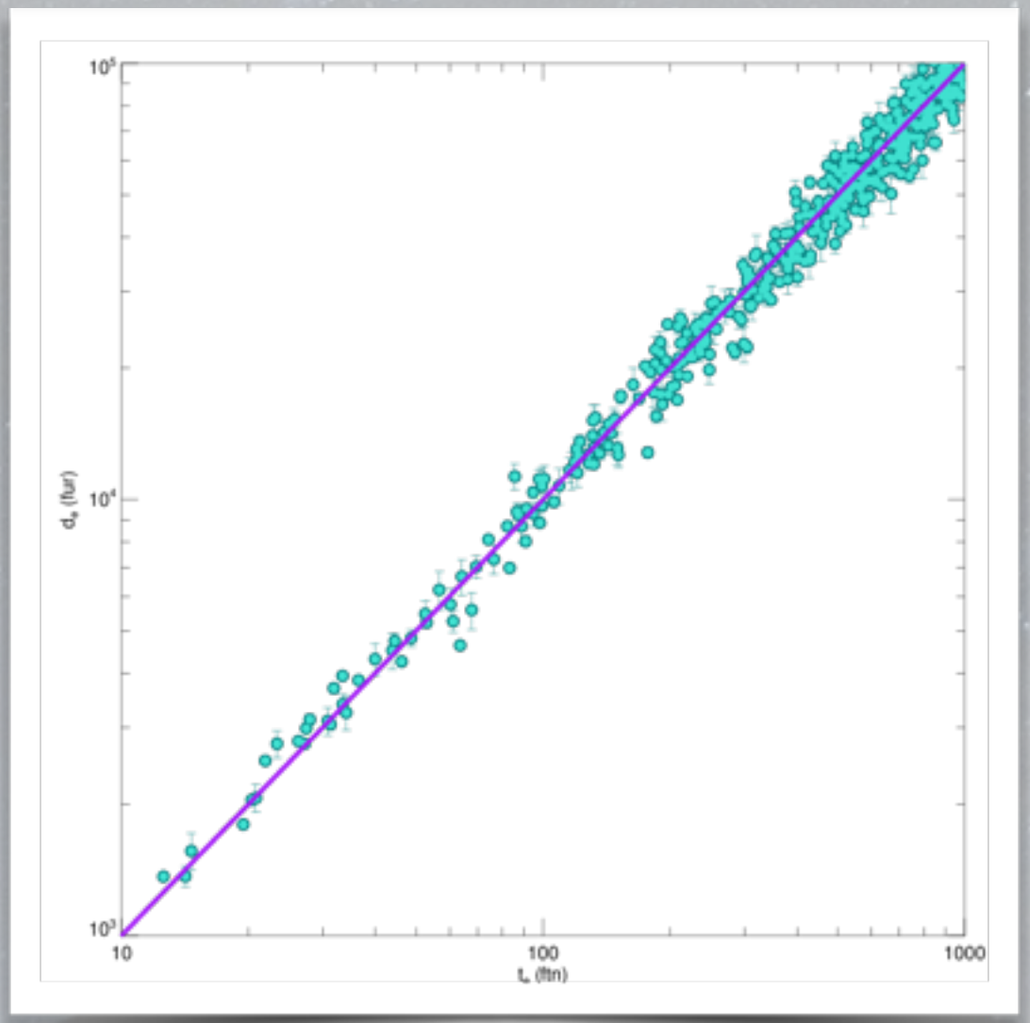

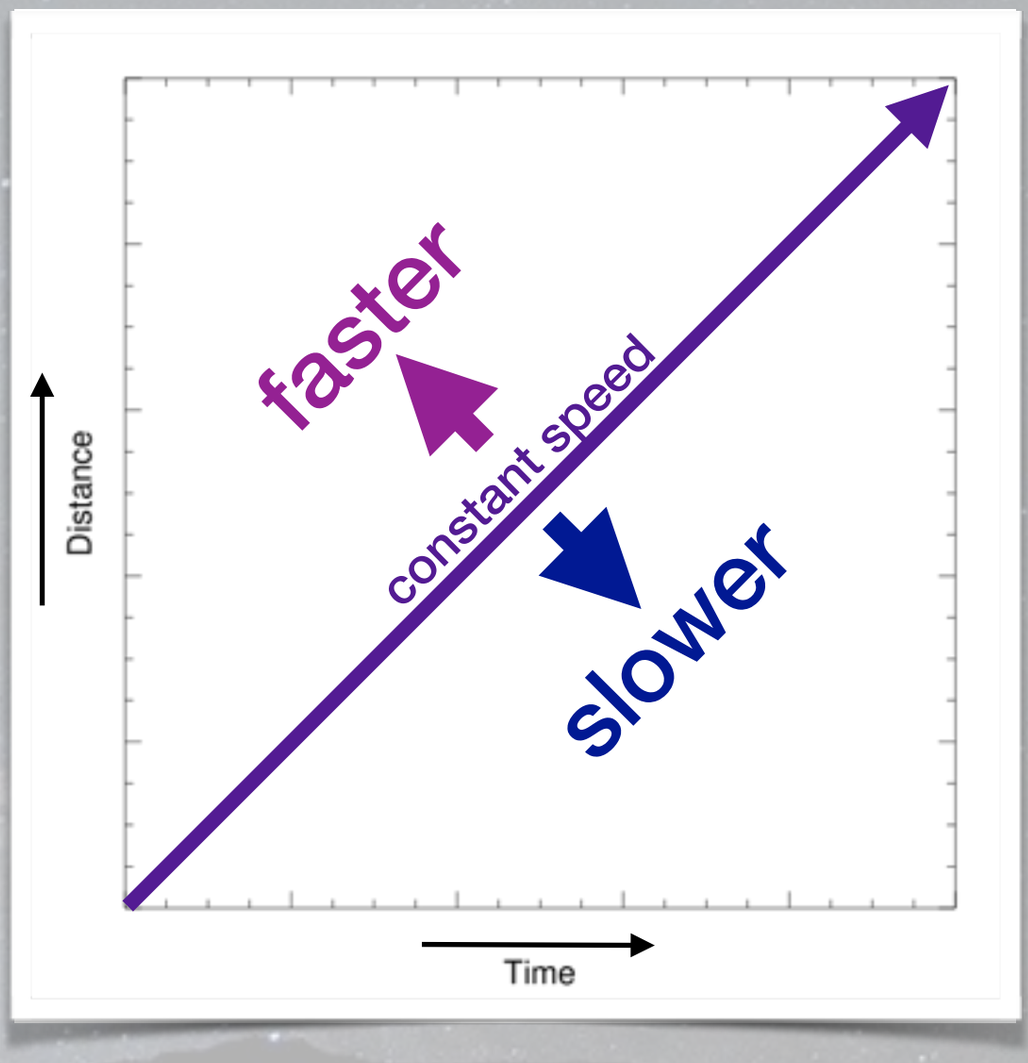

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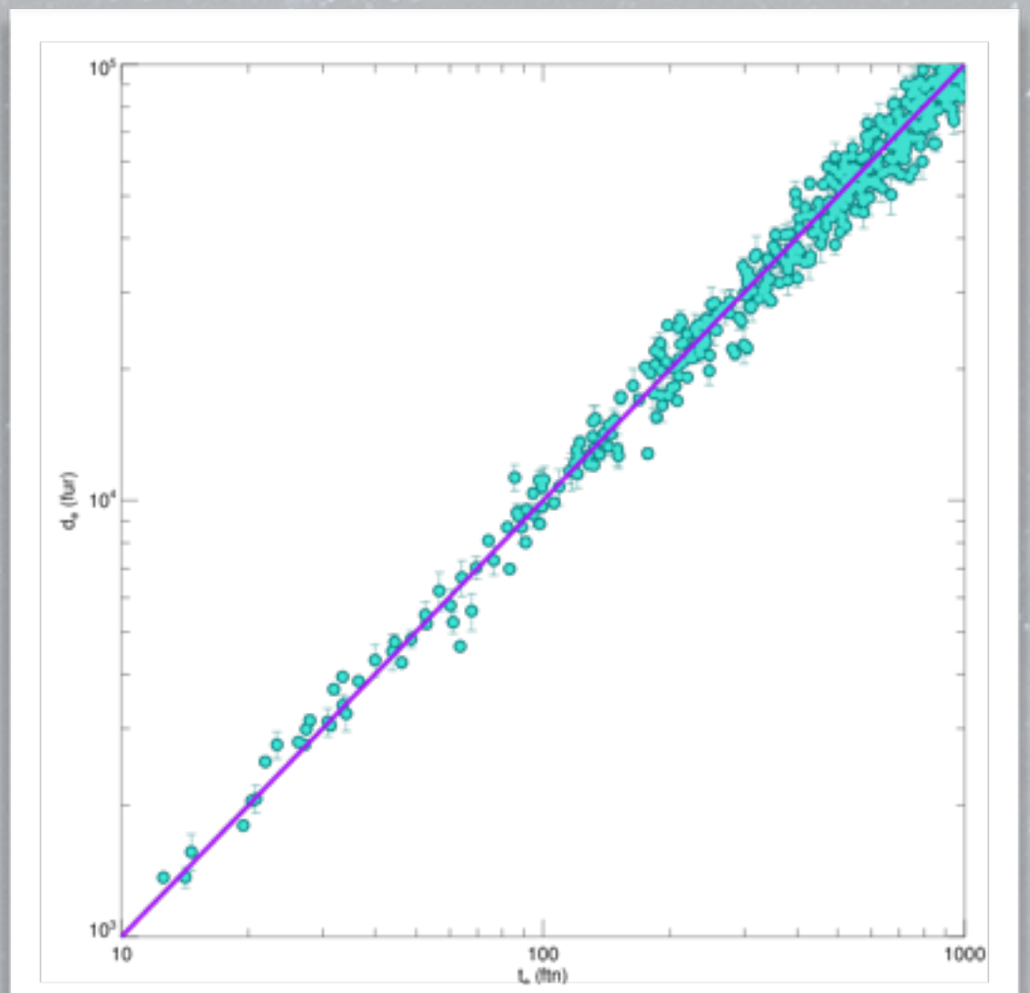

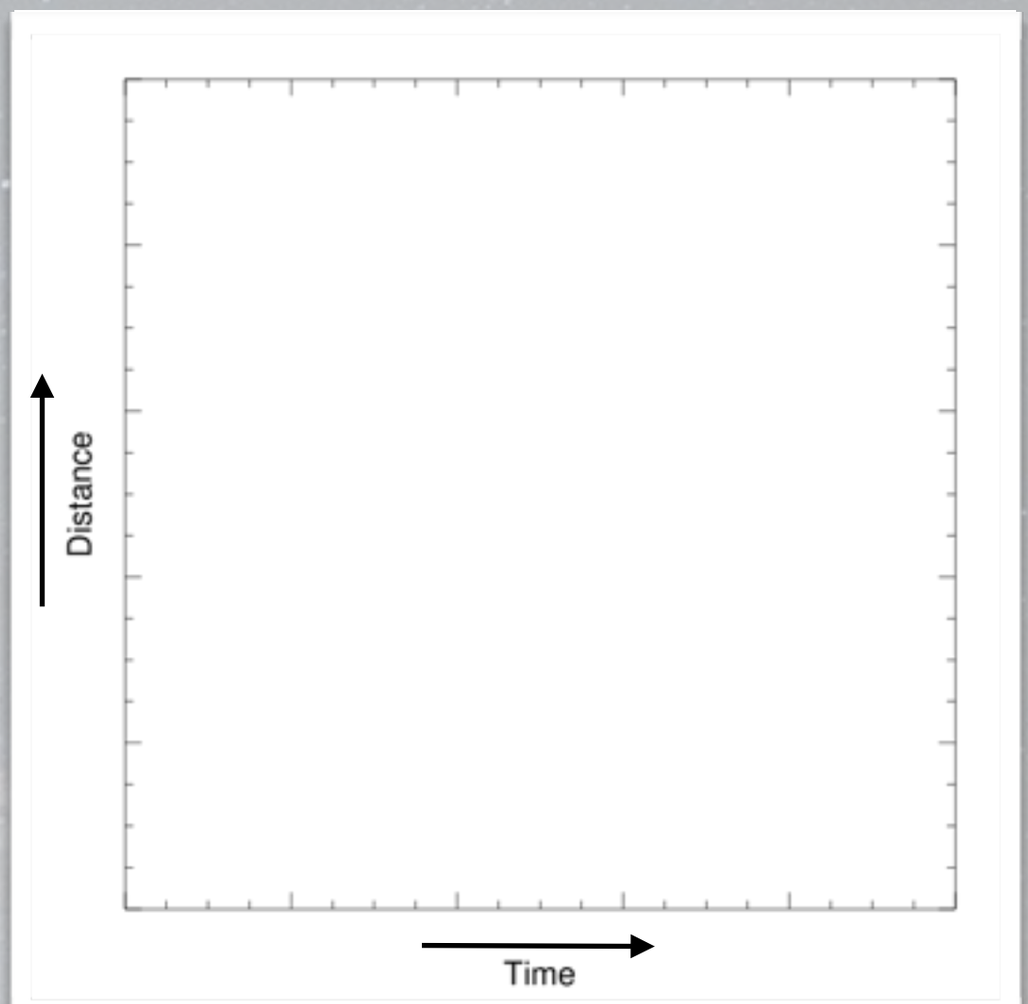

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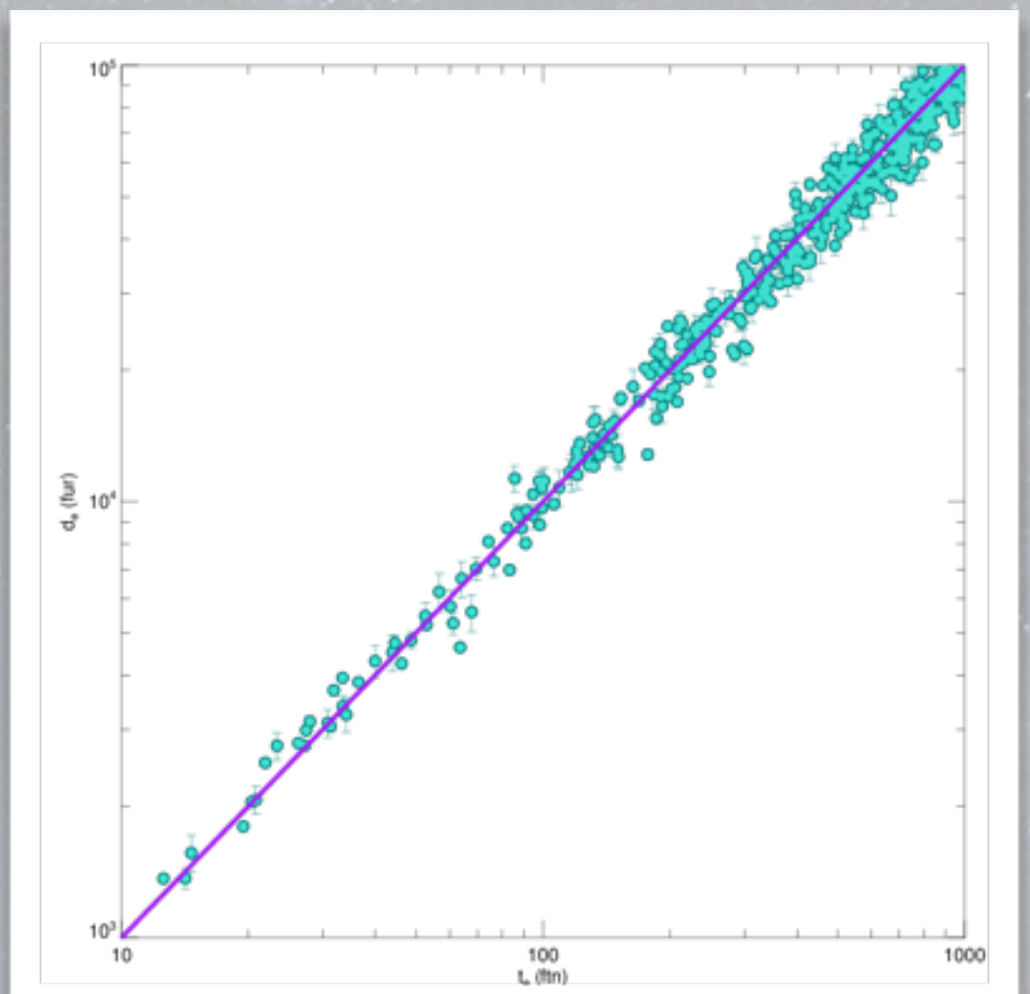

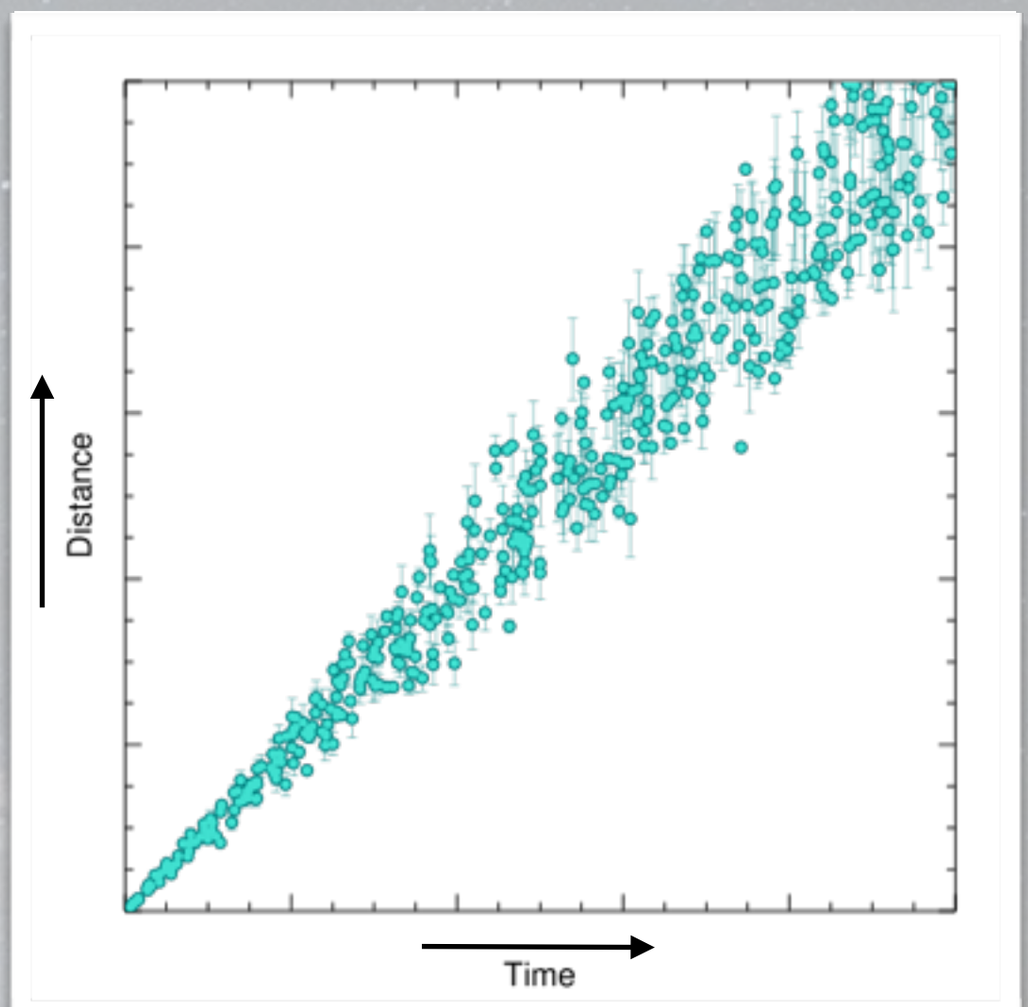

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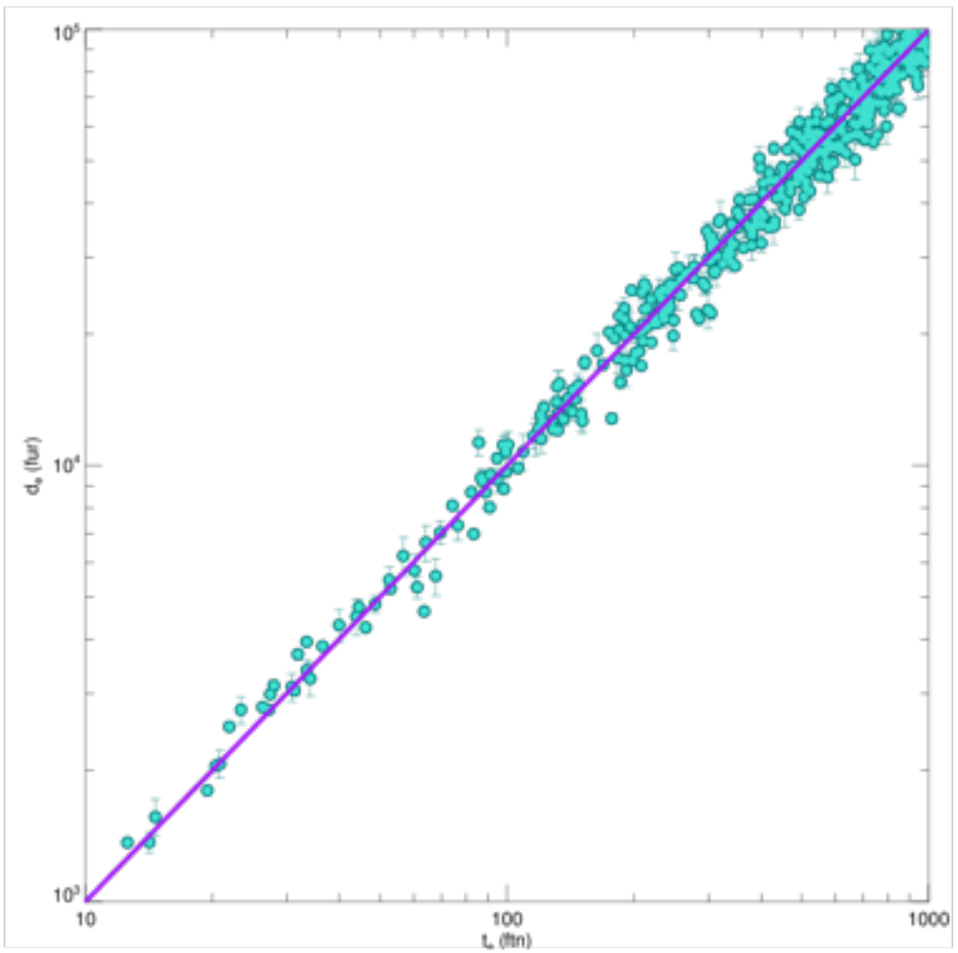

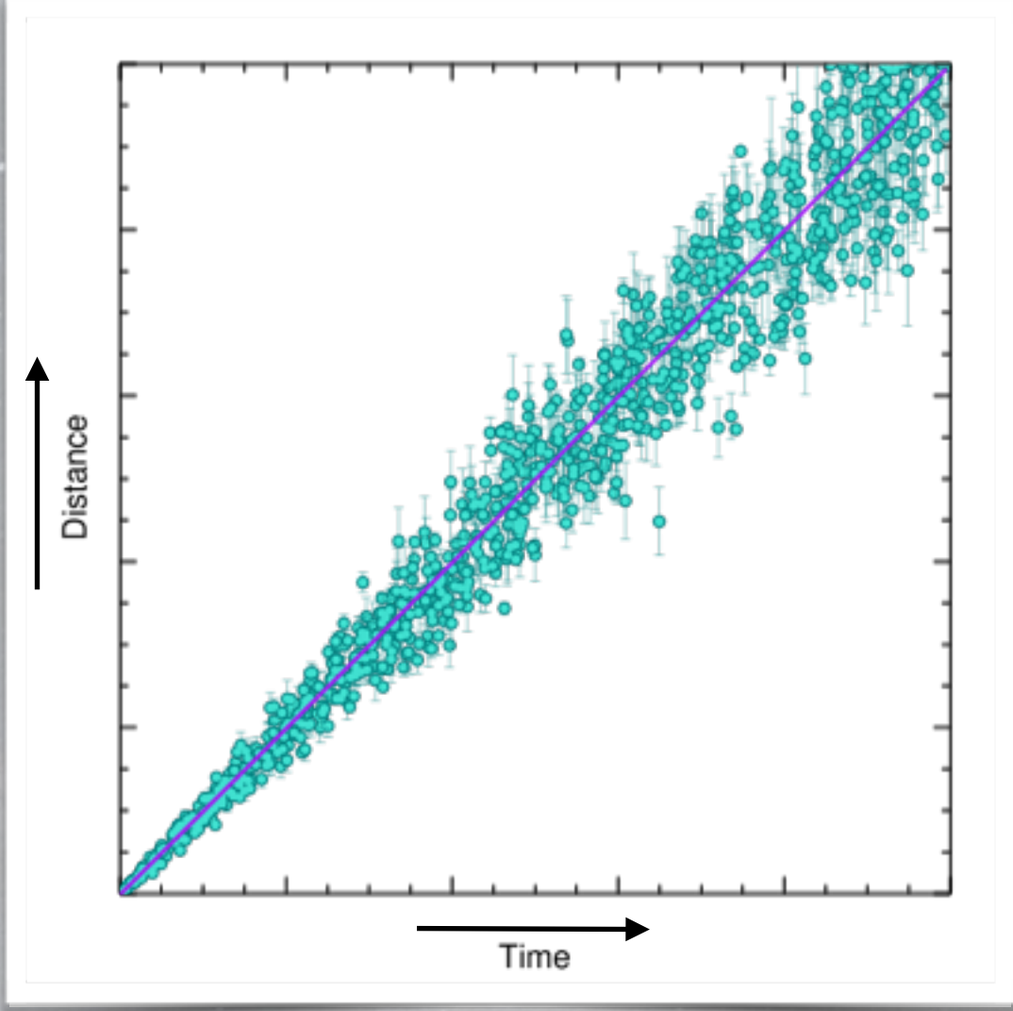

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- Remember people have given up time (and money?) to hear you speak

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  - Another self-selected group. Range in backgrounds can be HUGE.

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- But memorize useful scales/ analogies, answers to common questions, etc.

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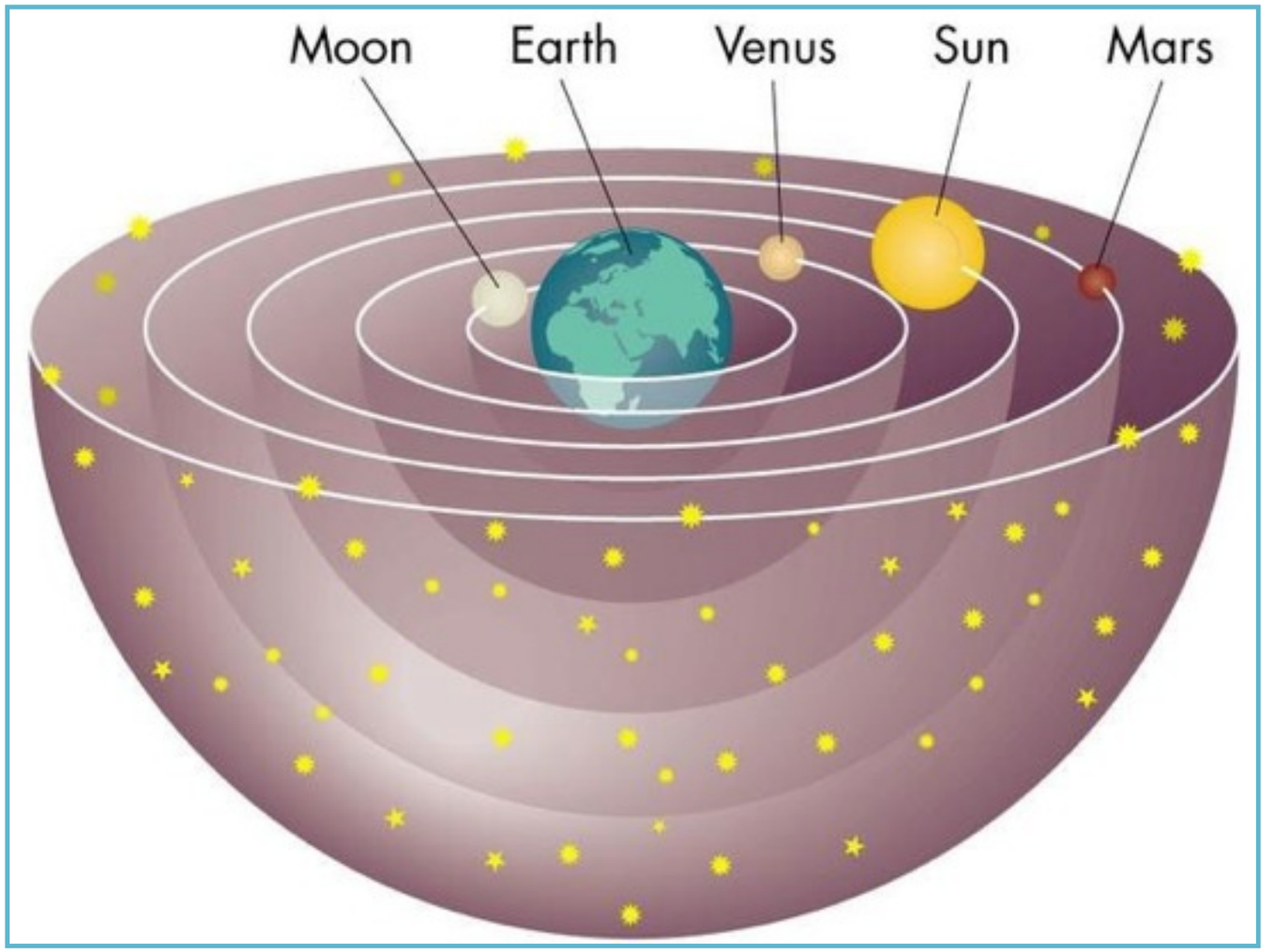
- On color choice: I usually prefer dark text on light background, BUT…

Ptolemy, 100-170 AD



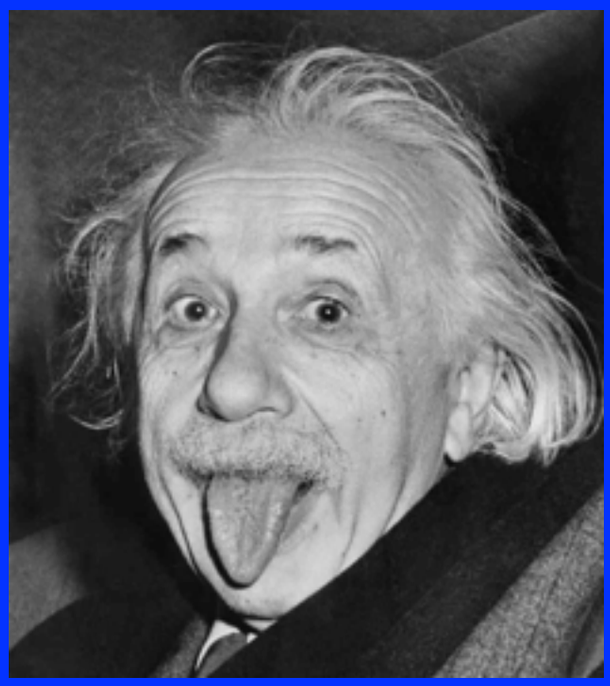
…“the natural motion of the Earth ….is towards the center of the universe; that is the reason it is now lying at the center.”

Aristotle, On the Heavens

General relativity is a metric theory of gravitation. At its core are Einstein's equations, which describe the relation between the geometry of a four-dimensional, pseudo-Riemannian manifold representing spacetime, and the energy–momentum contained in that spacetime. Phenomena that in classical mechanics are ascribed to the action of the force of gravity (such as free-fall, orbital motion, and spacecraft trajectories), correspond to inertial motion within a curved geometry of spacetime in general relativity; there is no gravitational force deflecting objects from their natural, straight paths. Instead, gravity corresponds to changes in the properties of space and time, which in turn changes the straightest-possible paths that objects will naturally follow. The curvature is, in turn, caused by the energy–momentum of matter. Paraphrasing the relativist John Archibald Wheeler, spacetime tells matter how to move; matter tells spacetime how to curve.

While general relativity replaces the scalar gravitational potential of classical physics by a symmetric rank-two tensor, the latter reduces to the former in certain limiting cases. For weak gravitational fields and slow speed relative to the speed of light, the theory's predictions converge on those of Newton's law of universal gravitation.

As it is constructed using tensors, general relativity exhibits general covariance: its laws—and further laws formulated within the general relativistic framework—take on the same form in all coordinate systems. Furthermore, the theory does not contain any invariant geometric background structures, i.e. it is background independent. It thus satisfies a more stringent general principle of relativity, namely that the laws of physics are the same for all observers. Locally, as expressed in the equivalence principle, spacetime is Minkowskian, and the laws of physics exhibit local Lorentz invariance.



Everything about this slide is terrible

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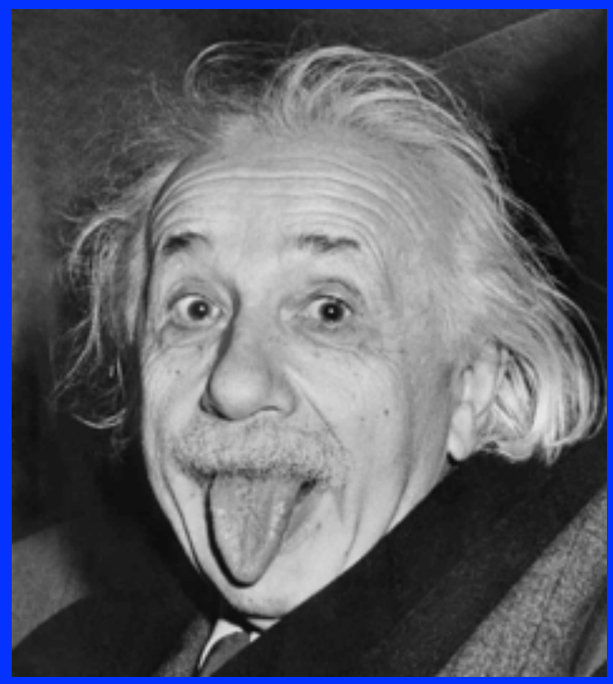
$$G_{\mu\nu} \equiv R_{\mu\nu} = -\frac{1}{2} R g_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$$



Homer's Web Page

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General presentation habits

- Use graphics! Just don’t make them distracting

Credit: NASA/ESA

Tools for making shiny movies

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- Celestia - lots of built-in astronomical images, can script your own flight paths
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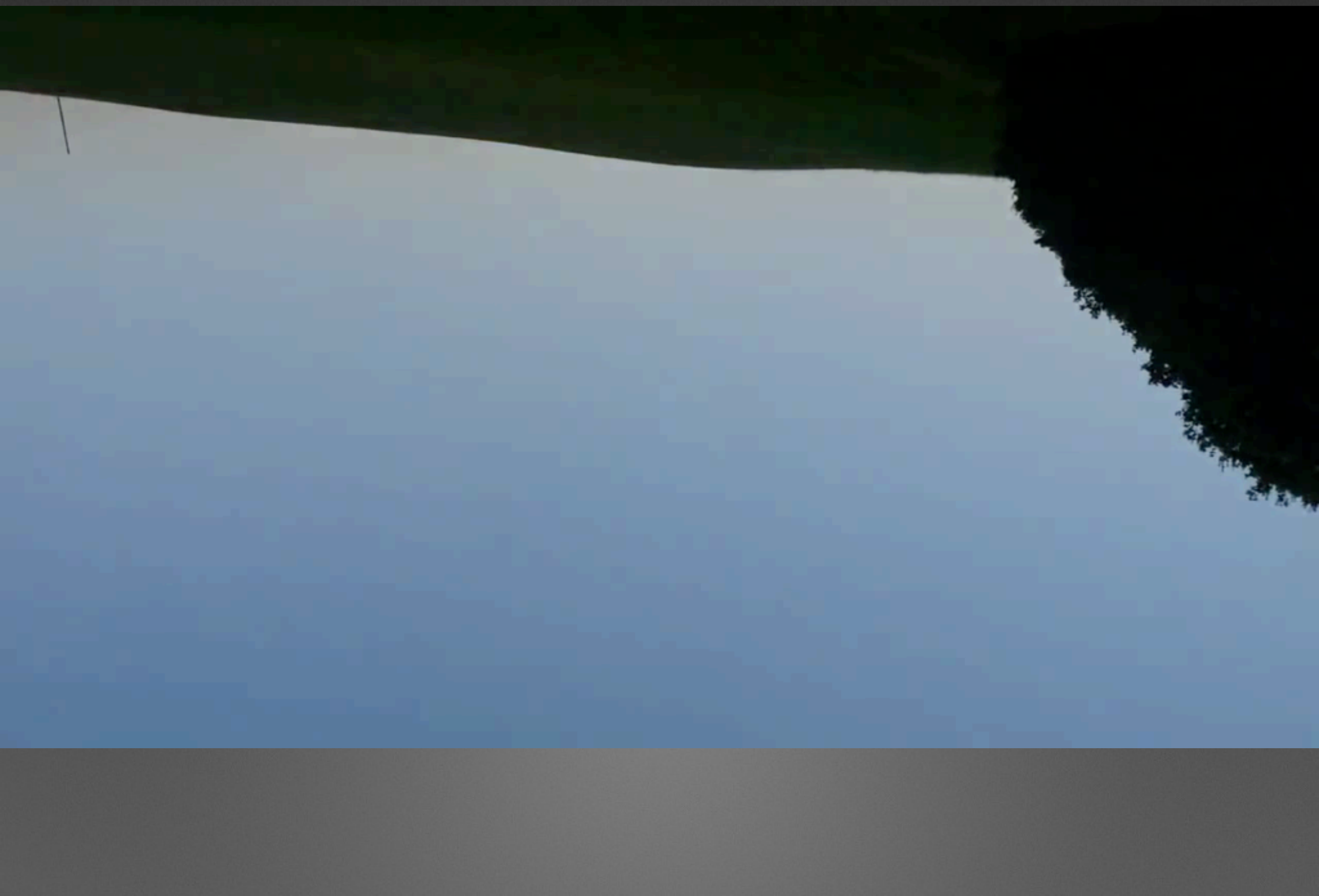

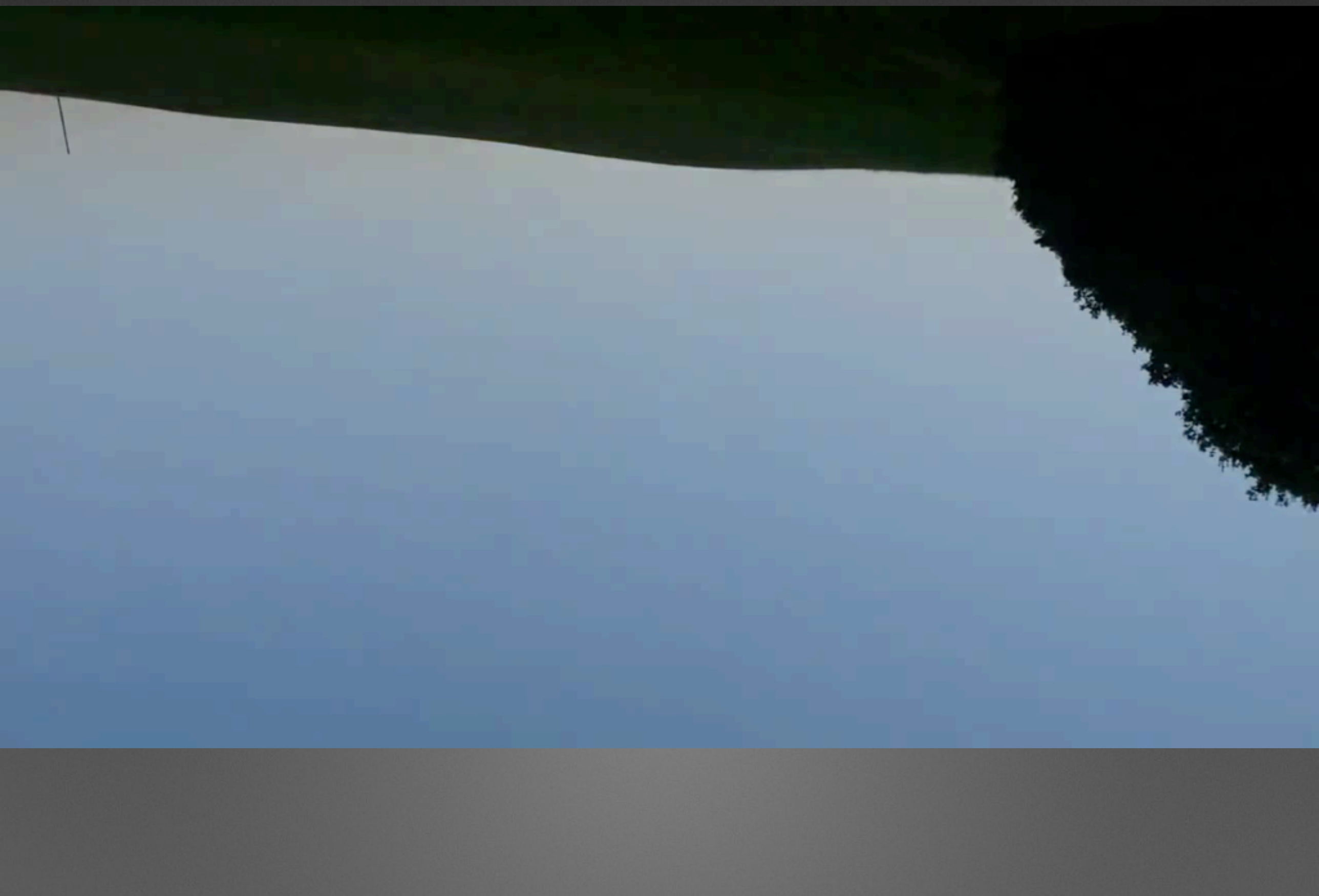

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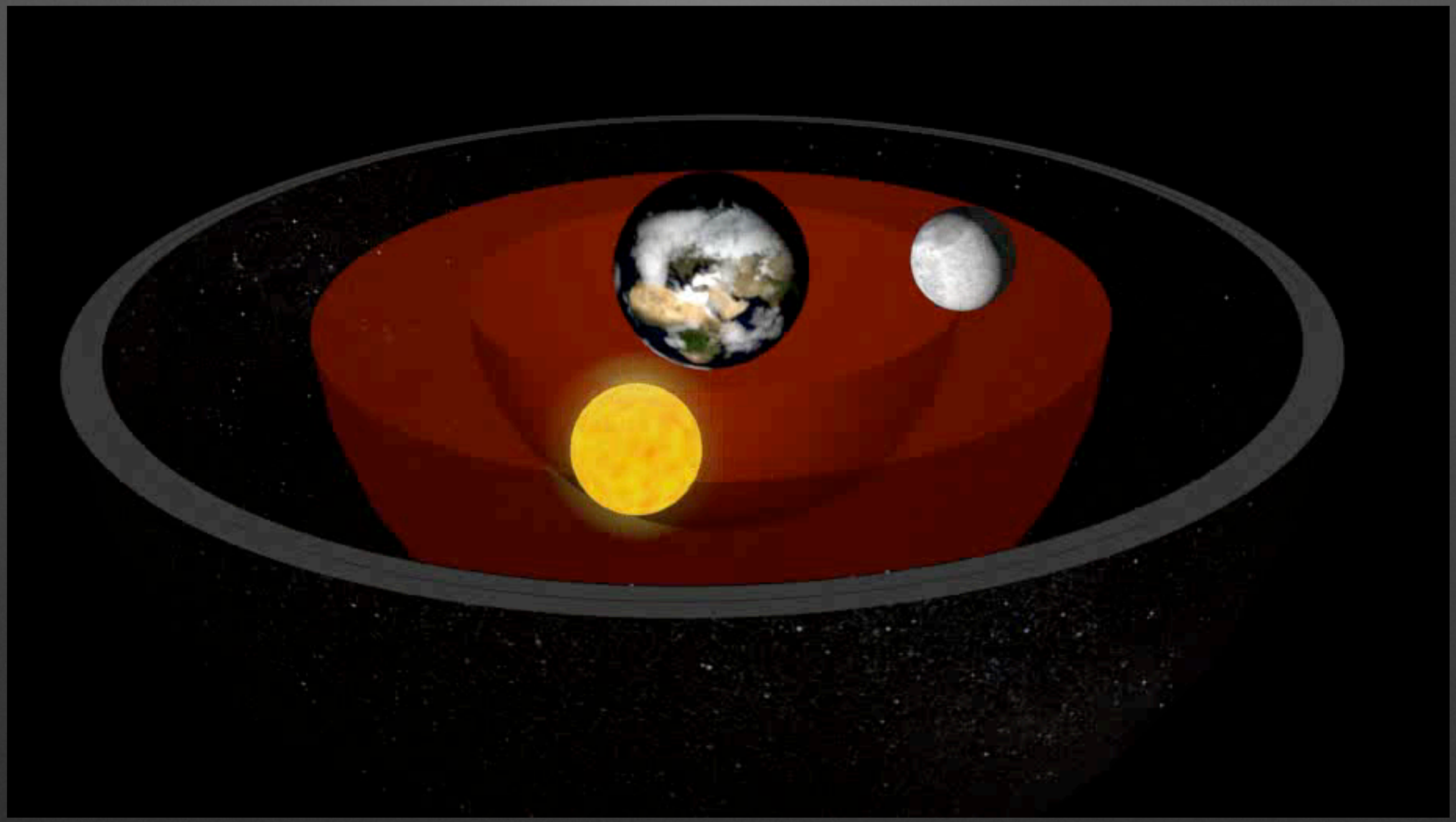

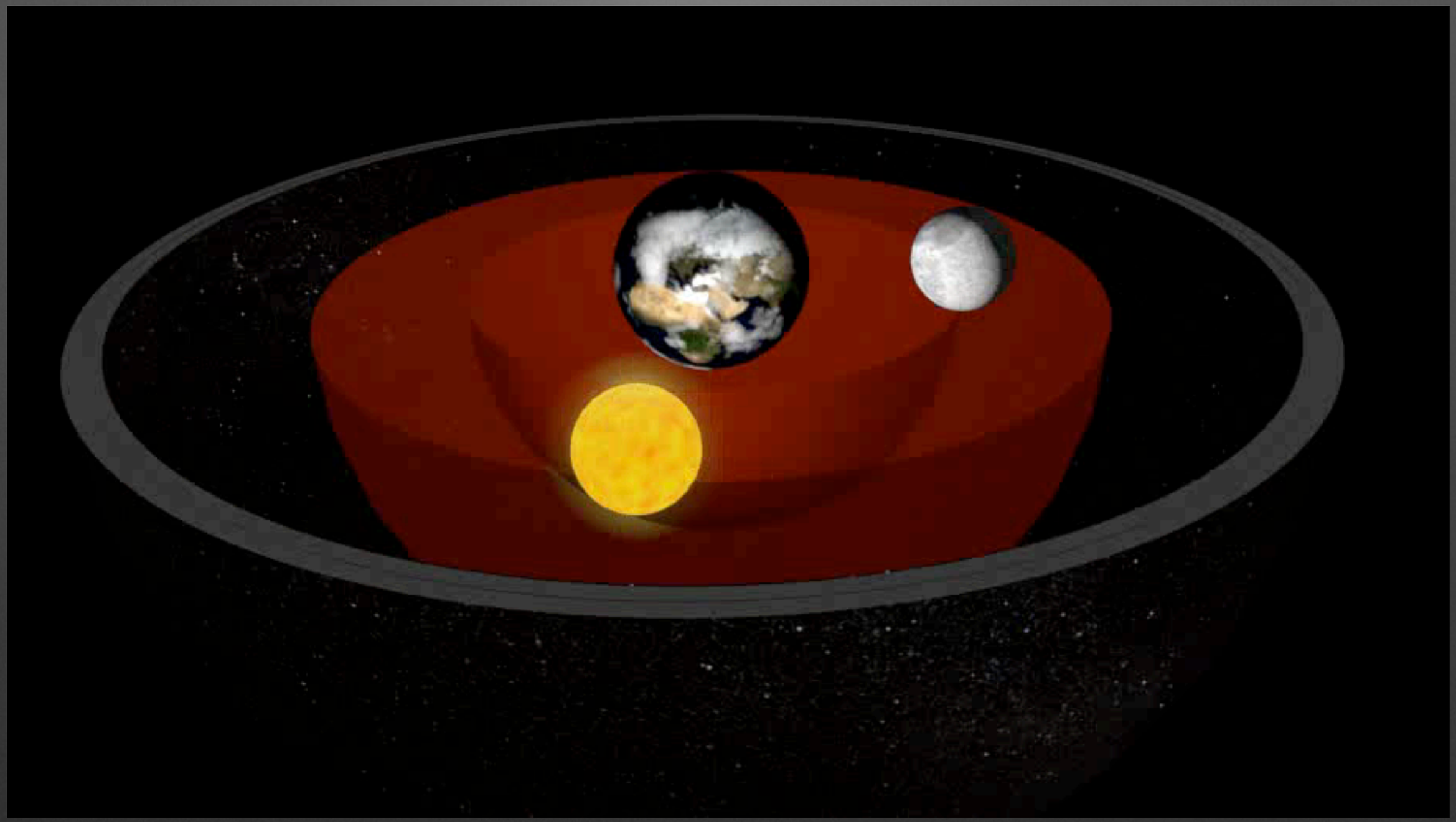

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- Watch your audience
- Prepare quick answers for the Q&A
- Make your slides engaging and easy to read (do what I say, not what I do)
- What is your take-home message?