The speed of gravitons in two-slit diffraction

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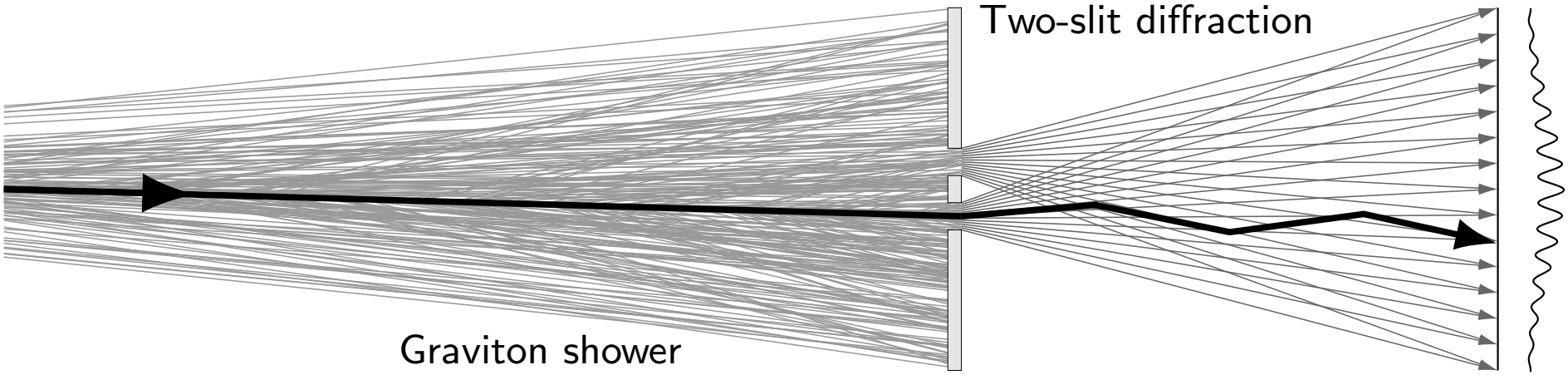

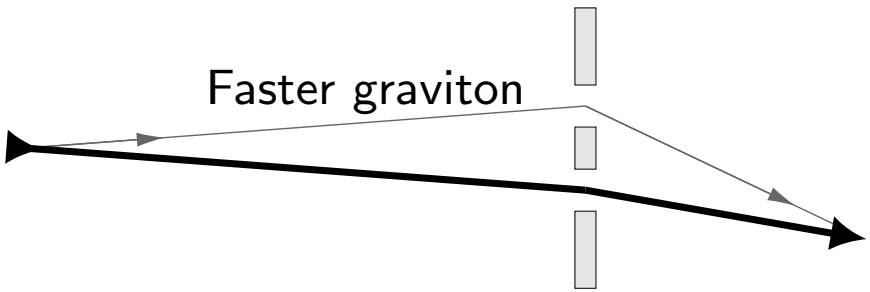

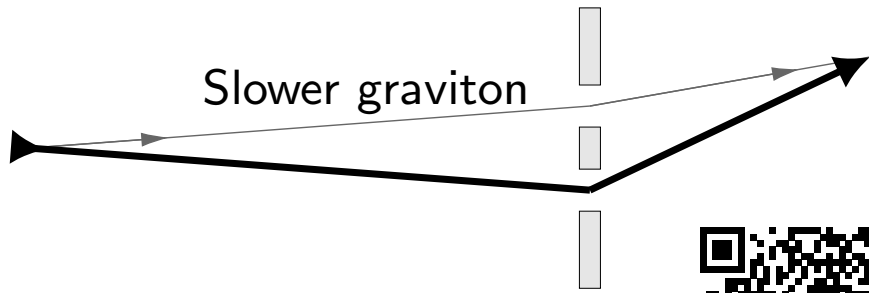

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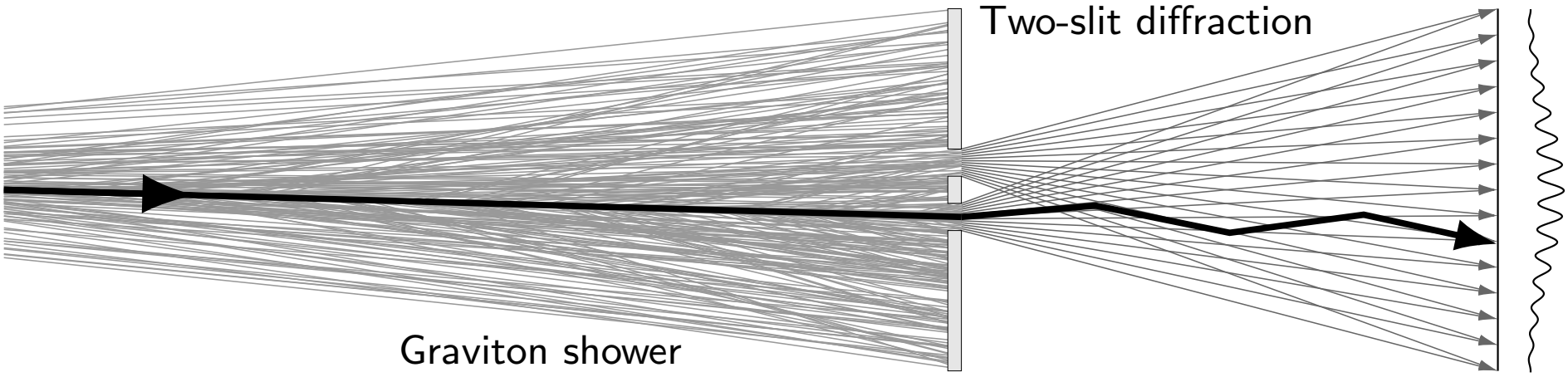
Two-slit diffraction: graviton showers

Feynman said that single-particle two-slit diffraction is "a phenomenon which is impossible, *absolutely* impossible, to explain in any classical way, and which has in it the heart of quantum mechanics. In reality it contains the *only* mystery."

In order to build up an interference pattern, quantum mechanics requires the single particle to mysteriously go through both of the two slits, not just one slit.

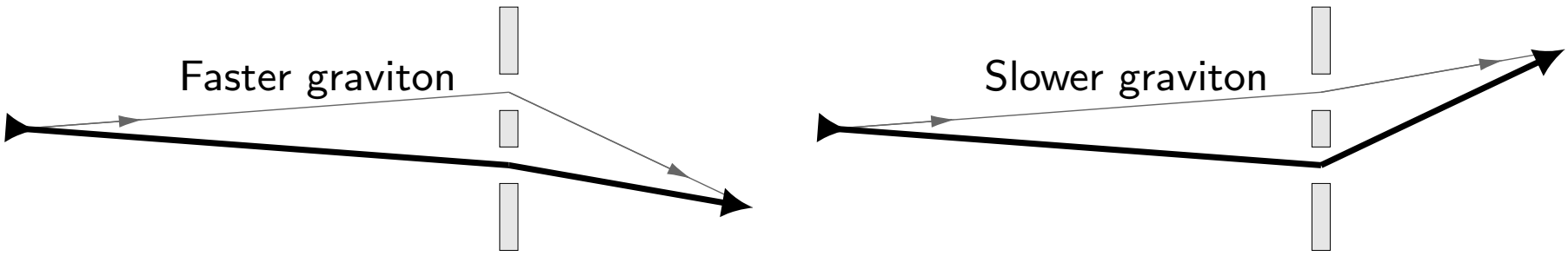
Quantum electrogravity (QEG) solves the mystery. In QEG, the particle does go through just one slit. The particle causes a graviton shower, the gravitons go through both slits while the particle goes through one slit, and reference frame interference ensues.



Two-slit diffraction is a quantum gravitational effect.

Two-slit diffraction: not Lorentz invariant

To ensure interference, the shower gravitons must have a range of speeds. Some of the gravitons must move faster than the particle, and some of the gravitons must move slower.



If the particle is a photon, then some of the gravitons must move faster than the photon. But nothing can move faster than photons in Lorentz invariant theories, so Lorentz invariant theories are inadequate to explain two-slit diffraction.

QEG is not Lorentz invariant. Also, QEG supplies the necessary gravitons.

Introduction to quantum electrogravity (QEG)

Overview: Quantum electrogravity (QEG) is a theory that unites quantum mechanics with Einstein's general relativity and Maxwell's electromagnetism, in Newton's absolute space and time. QEG uncurves space and time, resulting in three new kinds of gravitons: a scalar g graviton, a vector **w** graviton, and a matrix **S** graviton. g, **w**, and **S** stand for *g*ravitational, **w**eak, and **S**trong.

Scope: QEG quantizes gravity, space, and time. The field equations for the QEG gravitons are derived directly from general relativity. QEG explains previously inexplicable quantum phenomena. QEG explains dark matter. QEG supports a cosmological model – the holoverse – that explains parity violation and antimatter asymmetry. Current active research indicates that QEG can explain the periodic table of the particles in terms of bound gravitons.

Mechanics: In QEG, time is universal. Two events are simultaneous if they occur at the same absolute time. Every elementary particle has a precise three dimensional location in absolute space. Every elementary particle has a precise three dimensional velocity. Everything is particles. There is no wave/particle duality. There is no uncertainty principle. QEG is neither Lorentz invariant nor generally covariant.

I think that QEG is the Grand Unified Theory.

The field equations for the g, $\mathbf{w}$, and $\mathbf{S}$ gravitons

The field equations for the g, $\mathbf{w}$, and $\mathbf{S}$ gravitons are:

$$\frac{1}{c}\frac{dg}{dt} = g_{\text{mint}}, \qquad \frac{1}{c}\frac{d\mathbf{w}}{dt} = \mathbf{w}_{\text{mint}}, \qquad \frac{1}{c^2}\frac{d^2\mathbf{S}}{dt^2} = \mathbf{S}_{\text{mint}}, \tag{1}$$

where g_{mint}, $\mathbf{w}_{\text{mint}}$, and $\mathbf{S}_{\text{mint}}$ represent the mass/interaction terms, and the fields g, $\mathbf{w}$, and $\mathbf{S}$ correspond to blocks of the symmetric metric tensor $g_{\mu\nu}$:

$$g_{\mu\nu} = \begin{bmatrix} g_{00} & g_{10} & g_{20} & g_{30} \\ g_{10} & g_{11} & g_{21} & g_{31} \\ g_{20} & g_{21} & g_{22} & g_{32} \\ g_{30} & g_{31} & g_{32} & g_{33} \end{bmatrix} = \begin{bmatrix} g & w_1 & w_2 & w_3 \\ w_1 & S_{11} & S_{21} & S_{31} \\ w_2 & S_{21} & S_{22} & S_{32} \\ w_3 & S_{31} & S_{32} & S_{33} \end{bmatrix} = \begin{bmatrix} g & \mathbf{w}^{\mathsf{T}} \\ \mathbf{w} & \mathbf{S} \end{bmatrix}. \tag{2}$$

The field equations (1) are are ordinary differential equations; they use total derivatives and not partial derivatives. The g and $\mathbf{w}$ fields go as d/dt, so they are diffusive or Schrödinger-like. The $\mathbf{S}$ field goes as d^2/dt^2, so it is wavelike or Klein-Gordon-like.

Gravity waves: S gravitons in vacuo

In photon two-slit diffraction, some of the shower gravitons go faster than the photon, and some go slower. However, experiments have measured that gravity waves propagate almost exactly at photon speed, not faster, and not slower.

The reason for the apparent discrepancy is that in vacuo, the field equations (1) become singular. The equation of motion for the **S** gravitons degenerates to become the same as the equation of motion for photons, so that the **S** gravitons propagate at photon speed. Experiments that measure gravity waves are measuring **S** gravitons traveling in vacuo.

There are three generations of neutrinos, leptons, and quarks. It is an open question as to why.

It leaps to the eye that the three kinds of gravitons in QEG can answer the question about the three generations. One possibility (there are many) is that each of the three generations involves a different kind of graviton: an electron neutrino could be a g graviton bound to an uncharged electron. Another possibility is the reverse, that charge is a bound graviton: an electron could be a g graviton abound to an electron neutrino. Not to mention the possibilities involved when graviton mediators are considered. This is active research; expect speculation, changes, and corrections.

In QEG, all of the particles that can decay have at least one bound graviton. It is also looking increasingly likely that all of the non-graviton particles, even if they can't decay, have at least one bound graviton.

There are at least two ways that the gravitons might be bound: shell binding or point binding. If muons, for example, are actually point-like particles, then any bound gravitons must be point bound.

By adding bound gravitons to lower energy states, it appears to be eminently possible to build a periodic table of the particles.