Our understanding of the history of forces

In order to explore some of the thinking processes involved in the current dialogue between science and religion, I have imagined the following fable. The characters in my fable are modern-day versions of Galileo, Newton, and Leibniz. Also included is a lesser known historical figure, theologian Richard Bentley, with whom Newton corresponded. Galileo is pictured as a modern-day experimental physicist, performing increasingly precise experiments with falling bodies at the Leaning Tower of Pisa. I imagine him rapidly communicating his results by e-mail to Newton in Cambridge, who is contemporaneously developing his laws of motion and gravity. Of course, Galileo preceded the other characters by two generations, so this interchange is obviously not historical. Furthermore, although both men were brilliant theorists and experimentalists, I am going to impose a modern division of labor and have Galileo be strictly an experimentalist and Newton a theorist. Galileo will have the best modern equipment at his disposal, and I will imagine each as if he thought like a scientist of today, not one of the sixteenth and seventeenth centuries

Galileo died, and Newton was born, in 1642. That was a time of terrible religious persecution. During their lives, 50,000 women were accused of witchcraft and burned alive. Nineteen witch hangings in Salem were small potatoes beside that slaughter. Meanwhile, Galileo's science drifted into conflict with the Church. For years he'd attacked the Church's Aristotelian science. He did all right until late in life. Only near the end did the sun-centered universe become too much for the Church. And the real question isn't, "Why did Galileo get into trouble?" It is, "How did he stay out of trouble for so long?" Early in the game, Galileo learned a secret. He knew his observations must not contradict Church doctrine. But math was different. It was tool of God. He could wield math with impunity.

> To avoid being baited by little smatterers in mathematics, I designedly made the Principia abstract; but yet as to be understood by able mathematicians...

How Strong is Gravity? - Attraction between you and your neighbour μ ~1 mN - Between you and the Earth μ ~500 – 1000 N μ 25% of our weight comes from the attraction between us and the hemisphere furthest from us - Between you and the Sun μ ~ 0.3 N μ this force keeps us in orbit around the Sun -Between Earth and Sun μ ~ 1022 N

Newton's Law of Motion tells us that "the worldline of an object with a given mass experiencing a constant force is a parabola (which is completely determined by knowing the mass and the force)". If it respects Galileo's democratic Principle of Relativity, then all inertial observers should see the worldline of that object to be the same parabola. Indeed, this too is true

Galileo wrote:
...Have the ship proceed with any speed you like, so long as the motion is uniform and not fluctuating this way and that. You will discover not the least change in all the effects named, nor could you tell from any of them whether the ship was moving or standing still.