Working at the Jet Propulsion Laboratory (JPL), Anderson, Campbell, Ekelund, Ellis, and Jordan reported on and characterized orbital-energy changes during six Earth flybys by the Galileo, NEAR, Cassini, Rosetta, and MESSENGER spacecraft; the JPL researchers found an empirical prediction formula consistent with the anomalous energy changes.

http://virgo.lal.in2p3.fr/NPAC/relativite_fichiers/anderson_2.pdf "Anomalous Orbital-Energy Changes Observed during Spacecraft Flybys of Earth" (2008)

According to Wikipedia, "The flyby anomaly is an unexpected energy increase during Earth-flybys of spacecraft. This anomaly has been observed as a shift in the S-Band and X-Band Doppler and ranging telemetry. Taken together it causes a significant unaccounted velocity increase of over 13 mm/sec during flybys."

http://en.wikipedia.org/wiki/Flyby_anomaly

What might the flyby anomaly have to do with the Pioneer anomaly and Milgrom's Modified Newtonian Dynamics (MOND)? Define modified general relativity theory (GRT) with the Rañada-Milgrom effect to be the heuristic model obtained by replacing the -1/2 in the standard form of Einstein's field equations by -1/2 + dark-matter-compensation-constant, where this constant might be approximately sqrt((60±10)/4) * 10^-5, based upon the Rañada effect for the Pioneer anomaly combined with the empirical validity of MOND.

http://en.wikipedia.org/wiki/Pioneer_anomaly

http://en.wikipedia.org/wiki/Modified_Newtonian_dynamics

http://vixra.org/pdf/1203.0016v1.pdf "Anomalous Gravitational Acceleration and the OPERA Neutrino Anomaly (Updated)".

The slingshot effect in orbital mechanics uses the orbital angular momentum from a large body like a planet to increase the orbital velocity of a small body like a spacecraft.

http://en.wikipedia.org/wiki/Gravity_assist

Consider a particle or flyby spacecraft given an energy increase or decrease by the orbital angular momentum of a planet. Let us think of the excess acceleration as a red shift rather than a blue shift (i.e., multiply the torque by -1 if necessary). What does modified GRT with the Rañada-Milgrom real-or-apparent effect predict?

d(excess-redshifted-particle-momentum)/dt = dark-matter-compensation-constant * Einsteinian-gravitational-torque —> (approximately)

excess-redshifted-particle-velocity = (dark-matter-compensation-constant) * (Einsteinian-gravitational-torque/average-relativistic-particle-mass) —> (approximately)

excess-redshifted-particle-velocity = (Einsteinian-particle-velocity/c) * (Einsteinian-gravitational-torque/average-relativistic-particle-mass)

At this point, if we look at equations for the slingshot effect and the Anderson-Campbell-Ekelund-Ellis-Jordan (ACEEJ) ΔV/V equation, then we see that the hypothesis of the dark-matter-compensation-constant might be approximately confirmed.

http://www.dur.ac.uk/bob.johnson/SL/ The Slingshot Effect, Durham University

http://virgo.lal.in2p3.fr/NPAC/relativite_fichiers/anderson_2.pdf ACEEJ ΔV/V equation from "Anomalous Orbital-Energy Changes Observed during Spacecraft Flybys of Earth" (March 7, 2008) (See page 2 of the paper for the ΔV/V equation, where the V has the subscript ∞.)

The reasoning for the last equation in the preceding argument is that the Rañada-Milgrom effect should "bend the particle path" according to the dark-matter-compensation-constant * (the Einsteinian bending of light). If the Rañada-Milgrom effect is actually due to dark matter in the form of neutralinos, axions, or other dark matter particles, then the surprising bending would be due to undetected dark matter. According to Milgrom's ideas, the dark-matter-compensation-constant would be wrongly named and the name should be "discrepancy-in-GRT-constant", or some such name, Have astrophysicists and astronomers failed to realize the overwhelming importance of MOND? Is the Rañada-Milgrom effect empirically valid? Does the flyby anomaly prove the existence of dark matter correlated with planet Earth's gravitational field? Does the flyby anomaly prove that planet Earth's gravitational waves have more angular momentum than predicted by standard general relativity theory (GRT)? Are there quantum gravitational waves of dark matter that are far stronger than the gravitational waves predicted by standard general relativity theory?

http://en.wikipedia.org/wiki/Gravitational_wave