Abstract Submitted
for the APR08 Meeting of
The American Physical Society

Coherent and conventional gravidynamic quantum 1/f noise PETER H. HANDEL, THOMAS F. GEORGE, University of Missouri-St. Louis — Quantum 1/f noise is a fundamental fluctuation of currents, physical cross sections or process rates, caused by infrared coupling of the current carriers to very low frequency (soft) quanta, also known as infraquanta. The latter are soft gravitons in the gravidynamic case with the coupling constant g= pGM2/Nch considered here – soft photons in the electrodynamic case and soft transversal piezo-phonons in the lattice-dynamical case. Here p=3.14 and F=psi. Quantum 1/f noise is a new aspect of quantum mechanics expressed mainly through the coherent quantum 1/f effect 2g/pf derived here for large systems, and mainly through the conventional quantum 1/f effect for small systems or individual particles. Both effects are present in general, and their effects are superposed in a first approximation with the help of a coherence (weight) parameter s" that will be derived elsewhere for the gravitational case. The spectral density of fractional fluctuations S(dj/j,f) for j=e(hk/2pm)|F|2 is S(F2,f)/< |F|2> = S(j,f)/<j>2 = [4ps"/(1+s")]GM2/pfNch = 4.4 10E9 M2/(pfNgram2). Here s" = 2N'GM/c2=N'rs, where N' is the number of particles of mass M per unit length of the current, rs their Schwarzschild radius, and s" is our coherence (weight) parameter giving the ratio of coherent to conventional quantum 1/f contributions.

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Date submitted: 12 Jan 2008 Electronic form version 1.4