



Mercoledì 10 Ottobre 2018

Aula Magna del Dipartimento di
Fisica ed Astronomia
ore 15:00

***The ring of Brownian motion:
Past – Presence and Future Trends***

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Abstract: Since the turn of the 20-th century Brownian noise has continuously disclosed a rich variety of phenomena in and around physics. The understanding of this jittering motion of suspended microscopic particles has undoubtedly helped to reinforce and substantiate those pillars on which the basic modern physical theories are resting: Its formal description provided the key to great achievements in statistical mechanics, the foundations of quantum mechanics and also astrophysical phenomena, to name but a few. Recent progress of Brownian motion theory involves (i) the description of relativistic Brownian motion and its impact for relativistic thermodynamics, or (ii) its role for fluctuation theorems and symmetry relations that constitute the pivot of those recent developments for nonequilibrium thermodynamics beyond the linear response.

Although noise commonly is hold as the enemy of order, it in fact also can be of constructive influence. The phenomena of *Stochastic Resonance* and *Brownian motors* present two such archetypes wherein random Brownian dynamics together with unbiased nonequilibrium forces beneficially cooperate in enhancing detection and/or in facilitating directed transmission of information. The applications range from information processing devices in physics, chemistry, and physical biology to new hardware for medical rehabilitation. Particularly, additional non-equilibrium disturbances enable the rectification of haphazard Brownian noise so that quantum and classical objects can be directed along on a *priori* designed routes (i.e. Brownian motors. We conclude with an outlook of future prospects, trends and unsolved issues.