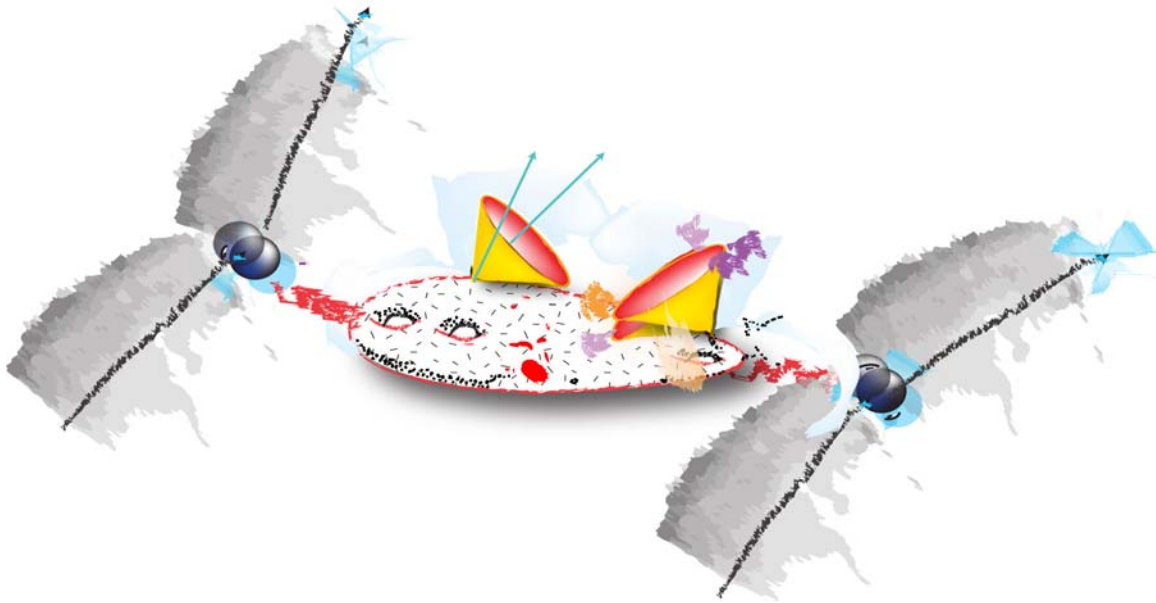# Geometric Flows in Mathematics and Theoretical Physics

Centro Ennio De Giorgi – Scuola Normale Superiore di Pisa, 22-25 June 2009

Ricci flow has been the point of departure and the motivating example for important developments in geometric analysis, most spectacularly for G. Perelman's proof of Thurston's geometrization program for three-manifolds and of the famous Poincaré conjecture. As it is well known, the Ricci flow also appears naturally in Quantum Field Theory (QFT), as the weak coupling limit of the renormalization group analysis of non-linear sigma models. The existence of a QFT avatar is by no means an exclusive of Ricci flow, but it is a property shared by the mean curvature flow, by the curve shortening flow, and many other (weakly) parabolic flows of geometrical nature. Such an observation suggested that methods of quantum field theory may have useful applications in geometric flow theory, and has been the motivating stimulus of a remarkable series of meetings among mathematicians and physicists working in geometric analysis and in quantum field theory. The first of such meetings was held at the Albert Einstein Institute in Potsdam in November 2006. That meeting was very successful and set an agenda that in a year span has already seen other two very stimulating workshops in Banff and Munich. Many ideas have been put forward during these meetings and it is becoming increasingly apparent that the interaction between mathematicians and physicists in this area is indeed very fruitful. The fourth in this series of workshops will be held in Pisa at the Centro De Giorgi of the Scuola Normale Superiore from the 22nd to the 25th of June 2009. As in the previous meetings, our objective is to provide a fast and informal channel of communications between the two communities, suggesting new problems of common interest and possible strategies of solutions. The properties of geometric flows discussed in depth by the methods of geometric analysis may shed light on the nature of significant models of QFT, whereas the imagination of QFT, often transcending and transgressing formal boundaries, may suggest new powerful strategies in geometric flow theory.

Speakers will include:

J. Bakas, G. Bellettini, H.-D. Cao*, F. Costantino, D. Friedan, J. Gegenberg, D. Glickenstein, J. Hoppe,
J. Isenberg, A. Magni, S. Maillot, L. Ni*, M. Petropoulos, M. Troyanov*, E. Tsatis, V. Suneeta, E. Woolgar
*To be confirmed

For more information, http://cvgmt.sns.it/MPRicci-Workshop or contact Mauro Carfora at Mauro.Carfora@pv.infn.it

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