SEMINARIO DI GEOMETRIA

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Lefschetz properties, Laplace equations and Togliatti systems

In a joint work with Rosa Maria Miro'-Roig and Giorgio Ottaviani (Canad. J. Math. 65, 2013), we established a closed relationship, due to apolarity, between homogeneous Artinian ideals I of the polynomial ring which fail the Weak Lefschetz Property - WLP - and projective varieties X satisfying at least one Laplace equation of order s for some s, i.e. all the s-osculating spaces have dimension strictly less than expected.

Thanks to this connection, it was possible to classify all smooth toric rational threefolds parametrized by cubics, satisfying a Laplace equation of order 2, extending a classical theorem of Eugenio Togliatti for surfaces. In the seminar after recalling the notions and the relationship mentioned above, I will speak of some recent results on varieties satisfying Laplace equations, both in the rational and in the non-rational case.