Department of Mathematics
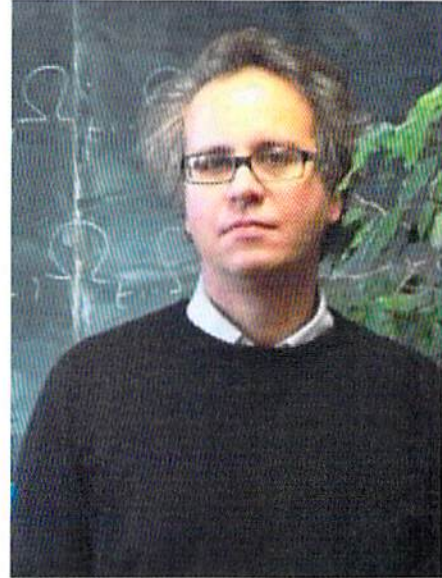## University of Notre Dame

FELIX KLEIN SEMINAR

Speaker: Adriano Tomassini
Università di Parma

Date: Thursday, April 25, 2019
Time: 2:00 PM
Location: 258 Hurley Hall

Lecture Title:
Hard Lefschetz Condition on Special Complex Manifolds

Abstract

A compact $2n$-dimensional symplectic manifold (M, ω) is said to satisfy the *Hard Lefschetz condition*, briefly *HLC*, if, for every $0 \leq k \leq n$, the map

$$[\omega^k] : H_{dR}^{n-k}(M) \to H_{dR}^{n+k}(M)$$

is an isomorphism. A classical result states that compact Kähler manifolds satisfy the HLC. Furthermore, HLC on compact symplectic manifolds is equivalent to the dd^Λ-*Lemma*, that is

$$\ker d \cap \ker d^\Lambda \cap (\operatorname{Im} d + \operatorname{Im} d^\Lambda) = \operatorname{Im} dd^\Lambda,$$

where d^Λ is the symplectic codifferential. A complex structure J on M is said to be ω-*symmetric* if, given any $x \in M$,

$$\omega(u, Jv) = \omega(v, Ju),$$

for every pair of tangent vectors $u, v \in T_x M$.

We will report some recent results obtained in a joint paper with Xu Wang, concerning the Hard Lefschetz Condition on compact symplectic manifolds endowed with a symmetric complex structure. Some examples will be presented.