

# Welcome Home Workshop 2014

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LINGUA PER LA CONFERENZA: Italiano

A 2-Sphere of Complex Structures

## Abstract

Let  $V$  be a complex vector space of complex dimension  $2k$ . Call  $\mathcal{J}(V)$  the space of all complex structures on  $V$  and suppose that  $V$  possesses two complex structures  $I$  and  $J$  such that  $IJ = -JI$ . In this case we can define a whole 2-sphere of complex structures, i.e. a map  $K: \mathbb{P}_{\mathbb{C}}^1 \rightarrow \mathcal{J}(V)$ . We also consider the tangent bundle  $T\mathcal{J}(V)$  to  $\mathcal{J}(V)$  and suppose to have a map  $A: \mathbb{P}_{\mathbb{C}}^1 \rightarrow T\mathcal{J}(V)$  that lifts  $K$ , i.e. such that the following diagram is commutative

$$\begin{array}{ccc} & & T\mathcal{J}(V) \\ & \nearrow A & \downarrow \\ \mathbb{P}_{\mathbb{C}}^1 & \xrightarrow{K} & \mathcal{J}(V) \end{array}$$

We will investigate the structure of  $A$  and show that it can be written as a quadratic matrix polynomial in the holomorphic coordinate  $\zeta$  of  $\mathbb{P}_{\mathbb{C}}^1$ , modulo conjugation by  $GL(k, \mathbb{C})$ .