Deformations of complexity-one rational T-varieties

THU/110
11:30–11:50

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Let X_0 be any rational normal variety with an effective action by some torus T of codimension one. In [2], R. Vollmert and I developed a combinatorial construction with which one can describe homogeneous deformations $\pi : X \to S$ of such X_0. If X_0 is smooth, complete, and toric, these deformations span the space of infinitesimal deformations. In fact, in this case, $H^1(X_0, \mathscr{T}_{X_0})$ can be easily read off from the fan corresponding to X_0, see [1].

It turns out that if π is locally trivial, for any point $s \in S$ there exists a natural map $\pi_s^0 : \text{T-CaDiv}(X_s) \to \text{T-CaDiv}(X_0)$, where T-CaDiv denotes the group of T-invariant Cartier divisors; this map is one of the subjects of study in [3]. Some of the main results can be summarized as follows:

THEOREM. *If X_0 is complete, then the map of divisors π_s^0 induces an isomorphism of Picard groups $\overline{\pi}_s^0 : Pic(X_s) \to Pic(X_0)$ such that for every $\mathscr{L} \in Pic(X_s)$,*

1. $\chi(\overline{\pi}_s^0(\mathscr{L})) = \chi(\mathscr{L})$;
2. $h^i(\overline{\pi}_s^0(\mathscr{L})) \geq h^i(\mathscr{L})$ *for all* $i \geq 0$.

In this talk, I will outline these recent results in a form requiring no prior knowledge of toric geometry. In a following talk, A. Hochenegger will apply some of these results to the study of exceptional sequences of lines bundles on rational $\mathbb{C}^*$-surfaces.

[1] N. ILTEN: *Deformations of Smooth Toric Surfaces*. arXiv:0902.0529v3 [math.AG], 2009.

[2] N. ILTEN AND R. VOLLMERT: *Deformations of Rational T-Varieties.* arXiv:0902.0529v3 [math.AG], 2009.

[3] A. HOCHENEGGER AND N. ILTEN: *Families of Divisors on T-Varieties and Exceptional Sequences on $\mathbb{C}^*$-Surfaces.* arXiv:0906.4292v1 [math.AG], 2009.