ON THE BIRATIONAL GEOMETRY OF MODULI SPACES OF POINTS ON THE LINE

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Moduli spaces of n ordered points on the line are constructed as GIT quotients of $(\mathbb{P}^1)^n$ by the diagonal action of $PGL(2)$ with respect to any polarization. These spaces are closely related to the Deligne-Mumford compactification $\overline{M}_{0,n}$ of the moduli space of smooth rational curves with n ordered marked points.

A complete characterization of these GIT quotients in terms of linear systems on $\mathbb{P}^{n-3}$ has been given by C. Kumar in terms of suitable linear systems on $\mathbb{P}^{n-3}$. Thanks to Kumar description we will manage to describe special arrangements of linear spaces in these quotients, yielding interesting results on their biregular geometry.

Furthermore, we will interpret the GIT quotient associated to the symmetric polarization as a small transformation of the blow-up of $\mathbb{P}^{n-3}$ at $n-1$ points, and we will determine its cones of curves and divisors. Finally, we will see how classical and well-known facts about the geometry of the Segre cubic, that is, the unique (modulo automorphisms of $\mathbb{P}^4$) cubic hypersurface in $\mathbb{P}^4$ with ten nodes, descend from our results.

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