Brill-Noether loci of the moduli space of curves

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Projective morphisms on algebraic curves are basic tools in algebraic curve theory. One of the interesting problems is what or how many curves possess a specific kind of projective morphisms. In this point of view, it is natural to consider the sublocus $\mathcal{M}^r_{g,d}$ of the moduli space $\mathcal{M}_g$ of genus g curves whose general point corresponds to a smooth curve possessing a degree d projective morphism to an $r-$dimensional projective space. $\mathcal{M}^r_{g,d}$ is called a *Brill-Noether locus of* $\mathcal{M}_g$. If the Brill-Noether number $\rho := g-(r+1)(g-d+r)$ is negative, then $\mathcal{M}^r_{g,d}$ has codimension at least one in the moduli space $\mathcal{M}_g$. In particular, if $\rho = -1$ then $\mathcal{M}^r_{g,d}$ is an irreducible divisor of $\mathcal{M}_g$ which has been used to analyze the geometry of the moduli space $\mathcal{M}_g$. The aim of this talk is to introduce specific reducible curves which can be used to investigate Brill-Noether loci.

Families of double covers

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Let $\mathcal{I}'_{d,g,r}$ be the union of the components of the Hilbert scheme whose general points represent smooth irreducible complex curves of degree d and genus g in $\mathbb{P}^r$. Severi claimed that $\mathcal{I}'_{d,g,r}$ is irreducible if $d \geq g+r$. His conjecture is true for $r = 3$ and 4, while for $r \geq 6$ there have been found counter examples using families of m-sheeted covers of rational curves with $m \geq 3$. In this talk, we show the existence of an additional component of $\mathcal{I}'_{d,g,r}$ whose general elements are double covers of curves of positive genus.

This is a joint work with Prof. Seonja Kim (Chungwoon Univ.) and Hristo Iliev (Institute of Mathematics and Informatics, BAS).