Classification of Abelian 1-Calabi-Yau Categories

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A k-linear abelian category $\mathcal{A}$ is said to be *Ext-finite* if $\dim \operatorname{Ext}^n(A,B) < \infty$ for all $n \in \mathbb{N}$ and all $A, B \in \operatorname{Ob} \mathcal{A}$. A *Serre functor* $F : \mathrm{D}^{\mathrm{b}} \mathcal{A} \longrightarrow \mathrm{D}^{\mathrm{b}} \mathcal{A}$ is an autoequivalence such that for all $X, Y \in \operatorname{Ob} \mathrm{D}^{\mathrm{b}} \mathcal{A}$

$$\operatorname{Hom}_{\mathrm{D}^{\mathrm{b}} \mathcal{A}}(X,Y) \cong \operatorname{Hom}_{\mathrm{D}^{\mathrm{b}} \mathcal{A}}(Y, FX)^*$$

natural in X and Y where $(-)^*$ denotes the vectorspace dual. We will say $\mathcal{A}$ is *n-Calabi-Yau* if $[n]$ is a Serre functor in $\mathrm{D}^{\mathrm{b}} \mathcal{A}$.

Recently, we have classified all connected abelian 1-Calabi-Yau categories over an algebraically closed field k. Up to derived equivalence these are either

1. the category of nilpotent representations of $k[[t]]$,
2. or the category of coherent sheaves over an elliptic curve.

In this talk, we will give a brief description of these two categories as well as an outline of the techniques used to prove the main result.