Homological projective duality for Pfaffian varieties

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Kuznetsov's theory of homological projective duality relates the derived categories of complete intersections in a smooth variety X to that of complete intersections in a different variety Y, the 'homological projective dual' of X. Fix k even and n odd with $k < n$, and let X be the Pfaffian variety $\mathrm{Pf}(k, n)$, i.e. the space of rank k anti-symmetric $(n \times n)$-matrices. We show that the HP dual Y is then $\mathrm{Pf}(n-k-1, n)$. In this case both X and Y are singular and must be replaced by non-commutative/categorical resolutions – we use a resolution which has recently been constructed by Špenko and Van den Bergh.

This result is motivated by work in physics by Hori, who has proposed a duality between certain pairs of gauged linear sigma models with non-abelian gauge groups. Our main statement follows from considering the category of B-branes associated with such theories (interpreted as the non-commutative resolution of X) and extracting from the proposed physical equivalence an equivalence of B-brane categories. This is joint work with Ed Segal.