ON IRREDUCIBLE PROJECTIVE VARIETIES $X^{r+1} \subset \mathbb{P}^N$ SUCH THAT THROUGH $n \geq 2$ GENERAL POINTS THERE PASSES AN IRREDUCIBLE CURVE OF DEGREE δ

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For varieties as in the title L. Pirio and J. M. Trépreau proved a sharp bound $N \leq \overline{\pi}(r, n, \delta) - 1$ in terms of a suitable *Castelnuovo bound function* $\overline{\pi}(r, n, \delta)$. The extremal cases for this bound are particularly relevant, share deep geometrical properties and for $n = \delta = 3$ lead to interesting connections with *quadro-quadric* Cremona transformations and with cubic complex Jordan algebras.

I shall present the main results of joint work with L. Pirio on the geometry of extremal varieties in the above sense, focusing especially on the case $n = \delta = 3$ and on its various applications.