Cremona transformations of $\mathbb{P}^3$ stabilizing quartic surfaces

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We are interested in Gizatullin's problem which consists in the following question: *Given a smooth quartic surface $S \subset \mathbb{P}^3$, which automorphisms of S are induced by Cremona transformations of $\mathbb{P}^3$?*
Cremona transformations of $\mathbb{P}^3$ can be written as a composition of a finite sequence of elementary maps. This is an algorithmic process called the Sarkisov Program. In this talk, we will solve Gizatullin's problem when $S \subset \mathbb{P}^3$ has Picard number two by using the Sarkisov program. The results that will be presented are in collaboration with Ana Quedo, and with Carolina Araujo and Sokratis Zikas.