Yeasts are important experimental organisms in biochemistry and molecular biology. A significant amount of moonlighting proteins have been described in different yeast species, most of them in *Saccharomyces cerevisiae*. The existence of moonlighting proteins raises several questions, among them that of their evolutionary origin and the possible selective advantage they confer. Could yeasts provide a good biological material to approach those questions? What can we learn from already available information? There are more than 700 yeast species some of which have been used as models in different areas of research like *S. cerevisiae* or *Schyzosaccharomyces pombe*. Whole genome sequencing of selected species has provided important information to study genome evolution. This information could be helpful to investigate the appearance or evolution of moonlighting properties; however, few systematic studies have been carried out with this purpose. In this talk we will consider two instances of moonlighting proteins implicated in sugar metabolism, one of them, hexokinase, participates in catabolite repression in *S. cerevisiae* and the other one, galactokinase, acts in the control of the induction of the proteins involved in galactose metabolism in *Kluyveromyces lactis*. We will discuss pertinent information that could allow some insight on the evolution of these proteins and also suggest possible experimental approaches to evolve moonlighting hexose kinases. 

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