In the famous paper Martin's Maximum, Foreman, Magidor and Shelah developed methods to make the nonstationary ideal precipitous (on certain cardinals). Goldring extended this construction to $P\kappa\lambda$. In this project we will try to find as big as possible a class of ideals which can be made precipitous (assuming sufficiently large cardinals, e.g., a class of supercompacts). A first goal is a theorem such as:

All nicely definable normal ideals on $P\kappa\lambda$ (kappa, lambda regular) are precipitous.

Of course we will have to find out what "nicely definable" means (for example, the notion cannot include the completely ineffable ideal).

We will also investigate the case of non-normal ideals and non-regular cardinals, as well as variants of precipitous, and try to contribute something to the old, unsolved questions of the field, such as: Does a precipitous ideal imply a normal precipitous one? Does a large cardinal imply a precipitous ideal on aleph1?

I will hire a PhD student (Wolfgang Wohofsky is designated for this) and collaborate with Moti Gitik (Tel Aviv University, Israel) and Saharon Shelah (The Hebrew University of Jerusalem, Israel). The project will last 24 months. The main part of the cost will be the salary of the PhD student. Other costs are four longer research visits of the PhD student and myself, and invitations of potential collaborators to two conferences in Austria.