

## The Concept of $\alpha$ -Molecules

Since classical wavelet systems are not optimally suited to represent multivariate data if anisotropic structures are involved, such as edges or rays in images for example, many new representation systems beyond wavelets have been developed over the last decade. Some of the most well-known of these nowadays termed directional representation systems are ridgelets, curvelets, and shearlets, to name just a few.

The great variety of new systems motivated the search for a common framework with the ability to simultaneously establish general results, concerning for example approximation properties. This led to the notion of  $\alpha$ -molecules, a generalization of parabolic molecules introduced earlier by two of the collaborators. This new concept is general enough to comprise all the aforementioned constructions, and at the same time still specific enough to capture their essential features and properties. To demonstrate this, we will apply the framework of  $\alpha$ -molecules to identify large classes of representation systems with the same sparse approximation behavior.

This research is joint work with P. Grohs (ETH Zürich), S. Keiper (TU Berlin), and G. Kutyniok (TU Berlin).