Topology is a branch of mathematics that studies the properties of (mostly geometric) objects that do not change when we distort an object without tearing it apart. During such a process, different angles and sizes may vary, but the number of elements that the object is composed or the number of different holes it can contain remain unchanged. These "topological invariants,, help us distinguish objects and, in some cases, classify them.

For example, in the topological classification of a surface, a number called the Euler characteristic plays a central role. It can be calculated by decomposing the surface into polygons. If V. E and F is the total number of their vertices, edges and faces, then Euler's characteristic is equal to $\chi = V - E + F$. This particular combination does not depend on the choice of decomposition, which is not true for individual numbers V, E, F.

The geometrical properties of the surface can be obtained recursively by assembling them from simpler pieces. The mathematical techniques needed in this case resemble the solutions of some models considered in statistical and quantum physics. This correspondence between geometry and physics proved beneficial for both disciplines.

Supersymmetry is an idea originally studied in physics, aimed at unifying the description (and thus improving our understanding) of two types of particles found in nature, the so-called bosons and fermions. This idea has its profound influence also in mathematics. In the context of surfaces, it enriches them with an additional structure (called spin) and transforms them into objects called "super-surfaces".

Recently, another type of object, important in the current context, called Airy structures, has been defined. One of their roles is to formalize the relationship between topological properties of surfaces and quantum mechanics. The aim of the current project is to investigate Airy structures in their supersymmetric incarnation. The results may be relevant to both quantum physics and geometry.