Since a few years the end of the Moore's law is prophesised. This is the law that predicts an exponential increase in the number of transistors in integrated circuits as the time goes. Indeed, the technology of manufacturing nanometer-sized tansistors is nothing new, and the $5\ nm$ technology, i.e. transistors where the size of the gate is about five bilionth of a meter, will allegedly be the end of Moore's law. The demand for computing power is ever-increasing, so the basic research is responsible for providing new solution, or rather solutions for industry – not only electronic, but also spintronic and even concerning quantum information. In recent years populatiry of the concept of topologically protected quantum bits is peaking. A few gropus reported the succesful manufacture of systems revealing topological superconductivity. This fact rekindled the interest in exotic states of matter and the number of both theoretical and experimental studies concering such issues remains high. The ability of experimental characterisation of materials with atomic resolution allowed for exploring the influence of various kinds of defects on the macroscopic properties of the bulk. Research of bound states stemming from a particular type of defects – magnetic impurities – helps to investigate exciting effects of the interplay between phenomena, which were once considered mutually exclusive, i.e. magnetism and superconductivity. The aforementioned states, dubbed Yu-Shiba-Rusinov states, emerge as a result of Cooper pair breaking by a magnetic moment localised at the impurity. The presence of magnetic impurities in superconductors can influence the whole system. When the interaction is sufficient enough, a quantum phase transistion occurs, and changes the ground states of the system. This effect can be observed empirically, because it is connected to the change of direction of the Josephson current – a current flowing between two superconductors, connected by a thin layer of isolating material. In the present project we will explore how unusual mechanisms of electron pairing influence the bound states in various configurations of impurities embedded in superconductors. We will also study how the Josephson current flowing through different systems of impurities is affected by the spin-orbit interaciton in presence of external magnetic field.