

# TMQS Summer School – Miniproject 1

## Singlet Fission Dynamics

In this miniproject, you will learn how to compute the dynamics of open quantum system using matrix product states (MPS) algorithms. We will use the EVOS Python package, which utilizes SyTen as an MPS backend. The project is divided in two parts:

### **Part 1: Single Qubit in a dissipative environment:**

In the first part, we consider one of the simplest open quantum systems: a qubit coupled to a dissipative environment, which can be described analytically. This example will help us to familiarize with the Lindblad equation (the equation of motion for Markovian open quantum systems) and with quantum jumps (a numerical method for solving the Lindblad equation).

### **Part 2: Singlet fission dynamics:**

In the second part, we apply the acquired knowledge to study a relevant physical problem: the singlet fission dynamics. As a minimal model, we will consider a system consisting of 3 two-level systems and 15 harmonic oscillators.