

## Open Ph.D. projects

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**Title of the research topic:** Examination of the replication of G-quadruplex prone DNA regions

**Description of the research topic:** The accurate replication of special DNA structures, namely the G quadruplexes (G4) is essential for the cells because its failure results in oncogene activation or cancer formation. Replication of G4 structures is likely a two-step process: first, a DNA helicase unwinds the stable G4 structure and second, the replication machinery replicates it.

The first wave of G4 replication research described several DNA helicases with G4 unwinding activity in vitro. Surprisingly the analysis of deletion strains showed that only a few of them show G4 replication failure. In yeast the deletion of pif1 gene has strong phenotype. Although in humans Pif1 is also present, the FancJ is known as the major G4 unwinding helicase. Our central hypothesis is that during replication the action of DNA helicases is tightly regulated and coordinated with the replication machinery at G4 sites. Our major question is: How does this regulatory mechanism work?