Dr hab. inż. Małgorzata Kotulska, prof. nadzw. Malgorzata.Kotulska@pwr.edu.pl

- Bioinformatics: modeling of proteins, biological sequences, metabolic pathways (computational methods). Application of electroporation to electrochemotherapy of cancers (experimental methods, collaboration with Medical University).

Prof. dr hab. Mirosław Kutyłowski miroslaw.kutylowski@pwr.edu.pl

- Parallel and distributed algorithms, ad-hoc systems, computational complexity, randomized algorithms, privacy enhancing technologies, computer security, cryptography, cryptographic hardware e-law, personal data protection.

Dr hab. inż. Jan Masajada, prof. nadzw. jan.masajada@pwr.edu.pl

- Imaging with optical vortices

Dr hab. inż. Grzegorz Sęk, prof. nadzw. grzegorz.sek@pwr.edu.pl

- Optical properties of low-dimensional semiconductor structures; quantum dots as single photon sources; light-matter coupling in nano and microstructures.
  Keywords: physics of nanostructures; optical spectroscopy; quantum dots; quantum electrodynamics.

Prof. dr hab. inż. Arkadiusz Wójs Arkadiusz.Wojs@pwr.edu.pl

- **Theory of photoluminescence from fractional quantum Hall states in excited Landau levels**
  The project involves composite fermion theory and numerical calculations (predominantly by different variants of massive exact diagonalization) of the photoluminescence (electron-hole recombination) spectrum of the system of correlated electrons in regime of fractional quantum Hall effect in excited Landau levels (two dimensions, high magnetic field, partial filling of an excited Landau level, Coulomb interaction). In particular, the main focus will be at the photoluminescence of the “Pfaffian” state realized at filling factor 5/2.

- **Theory of electron correlations in fractional quantum Hall systems based on graphene**
  The project involves theory and numerical calculations (mainly by exact diagonalization) of incompressible liquid states of fractional quantum Hall effect realized in graphene and related systems (in particular, in electrically tunable graphene bilayer). The main focus will be on search for realization in these systems of fermionic Jack states and various other incompressible liquid states with such exotic properties as non-abelian exchange statistics, relevant for storage and processing of topological quantum information.

- **Numerical engineering of electron correlations in two-dimensional lattice systems**
  The project involves theory and numerical modelling (mainly by exact diagonalization) of various strongly correlated states of electrons partially filling flat energy bands in suitable two-dimensional lattices. Various model interactions among the electrons will be studied including two-body and higher-order ones in search of realization of exotic correlated quantum phases, especially those relevant for manipulation of topological quantum information.

Prof. dr hab. inż. Paweł Machnikowski Pawel.Machnikowski@pwr.edu.pl,

- Optical properties of semiconductors - theory; decoherence processes in semiconductors; semiconductor quantum optics,