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| <b>Topic</b>                     | <b>Enhancing the sensitivity of NMR spectroscopy</b>  |
| <b>Topic is suitable for</b>     | <ul style="list-style-type: none"> <li>• practical works of bachelor students</li> <li>• graduation thesis of bachelor students</li> <li>• practical works of master students</li> <li>• graduation thesis of master students</li> <li>•</li> </ul>   |
| <b>Contact</b>                   | Dr. Indrek Reile, National Institute of Chemical Physics and Biophysics, <a href="mailto:indrek.reile@kbfi.ee">indrek.reile@kbfi.ee</a>   |
| <b>Annotation</b>                | <p>Magnetic resonance techniques (MRI, NMR) are particularly valuable analytical techniques in various fields, ranging from medicine to fundamental science. They are renowned for being robust, indiscriminative and non-destructive. The wider application of these techniques is, however, held back by their main drawback - their insensitivity. In MRI, insensitivity causes long analysis times. In analytical chemistry, insensitivity causes a high limit of detection. Sensitivity is often low enough to exclude NMR from several valuable applications, such as disease biomarker research, drug metabolism studies, etc.</p> <p>Our research addresses the sensitivity of NMR. The aim is to raise sensitivity sufficiently to allow adoption of NMR in new application fields that are, at present, left to other analytical techniques. Interested students will be involved in developing NMR signal enhancement techniques and developing new applications for NMR. We will prioritize development of biochemical and biomedical applications, where NMR has traditionally been unsuccessful due to the low sensitivity.</p> |
| <b>Expectation for candidate</b> | The student will learn the necessary skills in NMR spectroscopy and in biochemistry. The central theme will be applied NMR and the student will learn the essential physical and quantum mechanical principles of NMR, but will also be exposed to biochemical and biomedical research. Hence, the candidate can develop skills in several areas. The project will lead to a strong basis for a future career in NMR spectroscopy, biochemical research or biomedical research. The main expectation is willingness to engage in interdisciplinary research wherein the candidate is expected to develop his/her skills in NMR spectroscopy and in biochemistry. Prior knowledge of NMR spectroscopy will be a plus, but not a necessity.   |