SQUID-based ULF MRI and Superparamagnetic Relaxometry for Early Cancer Diagnostics

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Abstract - Ultra-sensitive detection and imaging of tagged tissue cells using superparamagnetic nanoparticles is a developing technique for early cancer diagnostics. SQUIDs are very suitable for such sensitive measurements. Relaxometry is used for detection of tagged cells with high specificity, as only bound nanoparticles are detected via Néel relaxation. By combining relaxometry with magnetic resonance imaging the tagged area can be imaged to provide information for the inverse problem solution. Such combination could provide both accurate localization and cell count of the tagged tissue, which would enable detection and localization of cancerous tissue at a very early disease stage.

Keywords – SQUID, MRI, relaxometry, early cancer detection, magnetic nano-marker.

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