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Whole body l-band resonator with a wide range frequency tuning using piezo actuator

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Measurements by present in vivo L-band EPR often are enhanced by using whole body resonators, but use of such resonators are connected with several challenging problems. One is the relatively large change in the resonator frequency caused by voluntary and involuntary movements of the animal. To overcome this, we designed a loop gap resonator (600 and/or 1200 MHz) with a metal plate that is a part of the resonators capacitor that can be displaced by a piezo bender. We have used a recently developed multilayer, low voltage non-magnetic piezo bender, that bends up to 0.5 mm, which is sufficient to change the resonant frequency by about 15 MHz. With the use of an automatic frequency control (AFC) system, this tuning range is sufficient to keep the resonant frequency constant and to compensate for the effects caused by the movements of the investigated object. A step motor is used as the base of the mechanical part of the matching adjustment.