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## MULTIPHOTON MAGNETIC RESONANCE IMAGING

Tech ID: 31629 / UC Case 2020-039-0

### PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	12,072,402	08/27/2024	2020-039

### BRIEF DESCRIPTION

UC Berkeley researchers have developed novel imaging techniques with the use of a multiphoton magnetic resonance imaging apparatus. By taking a particular rotating frame transformation the researchers found that multiphoton excitations appear just like single-photon excitations and can also use concepts explored in standard single-photon excitation. One prototype included a low frequency coil while another prototype included no additional hardware but instead used oscillating gradients as a source of extra photons for excitation. The methods and multiphoton MRI can be used to transform a standard slice selective adiabatic inversion pulse into a multiband version without modifying the RF pulse itself. The addition of oscillating gradients creates multiphoton resonances at multiple spatial locations and allows for adiabatic inversions at each location.

### ADVANTAGES

Excitation needs not be bound to the Larmor frequency, which opens doors to RF pulse design beyond the usual filter design and the potential for further imaging innovations.

### CONTACT

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### INVENTORS

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### OTHER INFORMATION

#### KEYWORDS

MRI, imaging, multiphoton, selective excitation

### CATEGORIZED AS

» [Imaging](#)

» [Medical](#)

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### RELATED CASES

2020-039-0

### ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ Frequency Programmable MRI Receive Coil
- ▶ Tumor Infiltration Detection And Cell Density Mapping
- ▶ Any-Nuclei Distributed Active Programmable Transmit MRI Coil