B.M.S. College of Engineering

Department of Medical Electronics Engineering

# Basics of Magnetic Resonance Imaging

## Prof. Vikram Kodibagkar

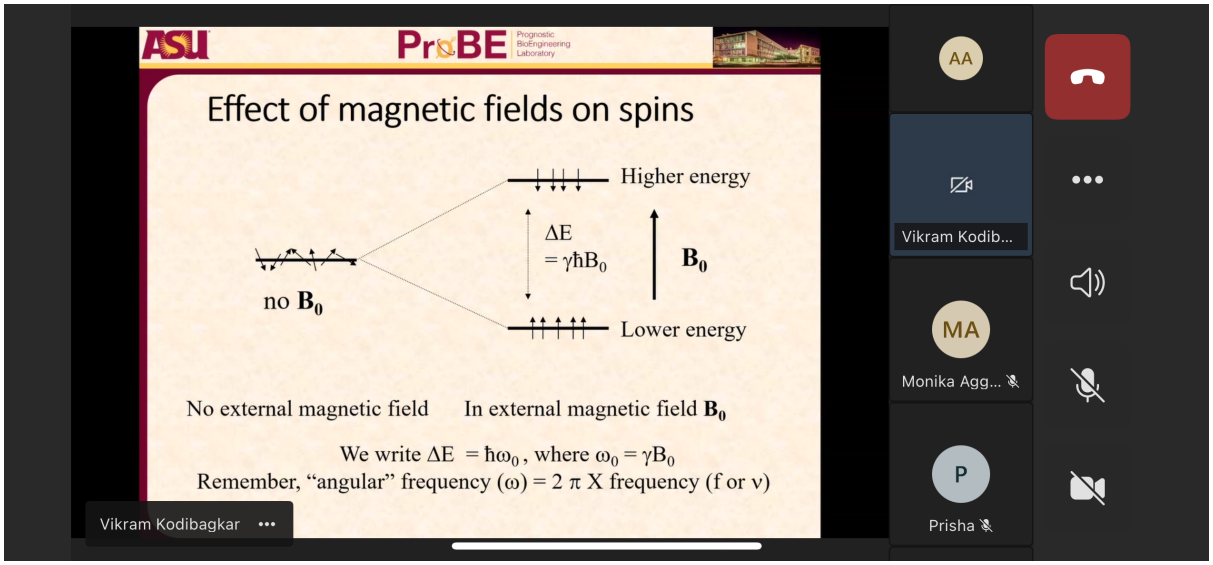
**Arizona State University, USA**

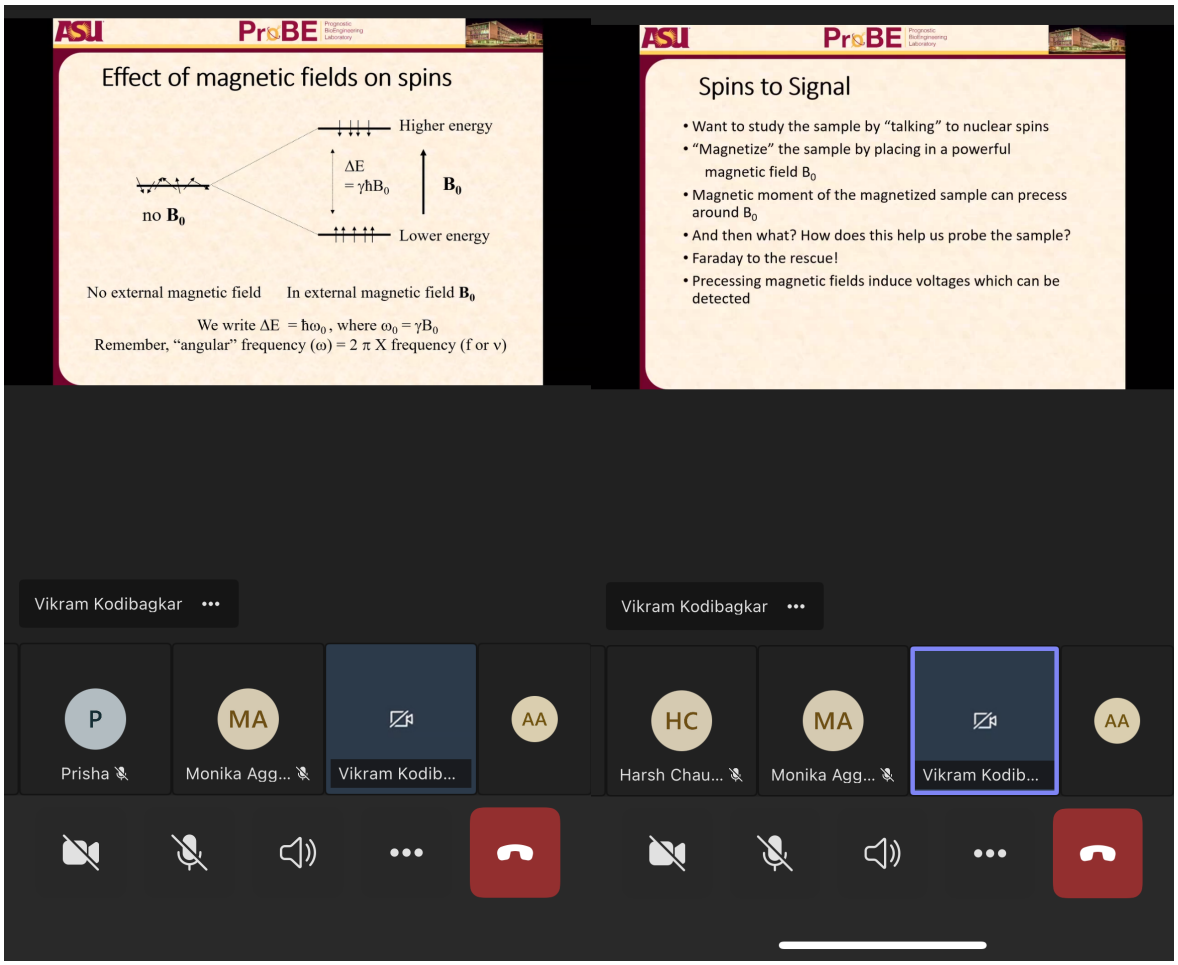
November 10 and 12, 2025
8 PM – 9 PM

Prof. Vikram Kodibagkar

*Prof. Vikram Kodibagkar, Professor at the School of Biological and Health Systems Engineering, Arizona State University, is an expert in MRI physics and molecular imaging. This talk demystifies the principles behind MRI technology, exploring magnetic fields, resonance, and image formation to bridge engineering with healthcare innovation.*

Coordinator:
Dr. Abhishek Appaji
abhishek.ml@bmsce.ac.in


ASU
PrOBE
Prognostic BioEngineering Laboratory
Effect of magnetic fields on spins
Higher energy
ΔE
= γħB0
B0
no B0
Lower energy
No external magnetic field
In external magnetic field B0
We write ΔE = ħω0 , where ω0 = γB0
Remember, "angular" frequency (ω) = 2 π X frequency (f or ν)
Vikram Kodibagkar
AA
Vikram Kodib...
MA
Monika Agg...
P
Prisha


ASU
PrOBE
Effect of magnetic fields on spins
Higher energy
ΔE
= γħB0
B0
no B0
Lower energy
No external magnetic field
In external magnetic field B0
We write ΔE = ħω0 , where ω0 = γB0
Remember, "angular" frequency (ω) = 2 π X frequency (f or ν)
Spins to Signal
• Want to study the sample by "talking" to nuclear spins
• "Magnetize" the sample by placing in a powerful magnetic field B0
• Magnetic moment of the magnetized sample can precess around B0
• And then what? How does this help us probe the sample?
• Faraday to the rescue!
• Precessing magnetic fields induce voltages which can be detected
Vikram Kodibagkar
Vikram Kodibagkar
P
Prisha
MA
Monika Agg...
Vikram Kodib...
AA
HC
Harsh Chau...
MA
Monika Agg...
Vikram Kodib...
AA

| Field | Detail |
|---|---|
| **Talk Title:** | **Basics of Magnetic Resonance Imaging** |
| **Speaker:** | **Prof. Vikram Kodibagkar, Ph.D.** |
| **Speaker Affiliation:** | Professor, School of Biological and Health Systems Engineering, Arizona State University (USA) |
| **Organized By:** | Department of Medical Electronics Engineering, B.M.S. College of Engineering, Bengaluru |
| **Date & Time:** | **Part 1:** Monday, November 10, 2025 (8:00 PM – 9:00 PM IST) |
| | **Part 2:** Wednesday, November 12, 2025 (8:00 PM – 9:00 PM IST) |
| **Format:** | Virtual Talk |
| **Target Audience:** | Students, researchers, and faculty in Medical Electronics, Bioengineering, Physics, and related healthcare technology fields. |

The talk was significant as it bridges the gap between fundamental physics and clinical engineering applications, which is highly relevant to students in Medical Electronics.

Attendees gained:

- A solid theoretical foundation in MRI technology.
- An appreciation for how technical parameters influence image quality and diagnostic information.
- Insight into cutting-edge research directions in biomedical imaging and probe development, particularly related to measuring tissue health (e.g., oxygenation and metabolism).