A GPR Survey of the Physics Department

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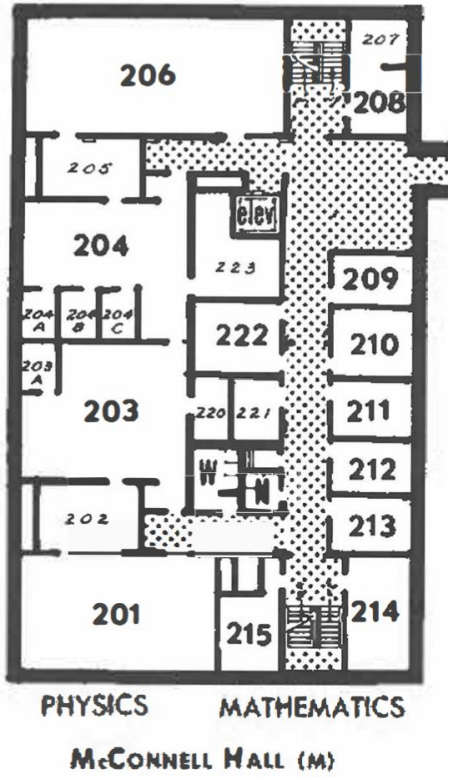
EGR 390 fall 2022

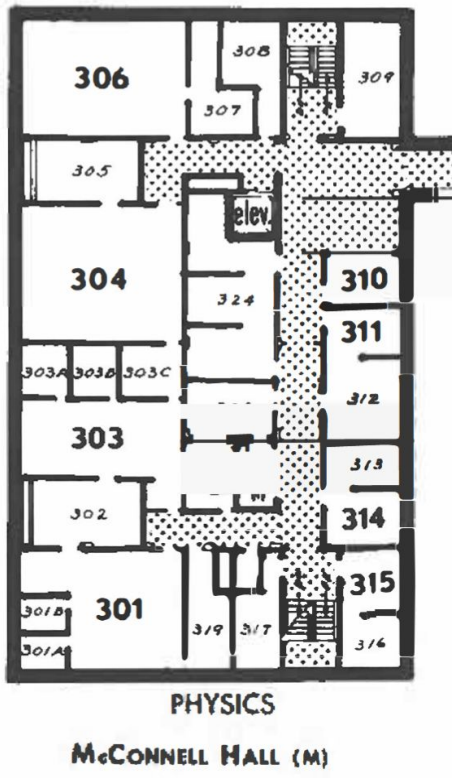
Introduction

McConnell Hall: opened in 1967

Smith College Physics Department: operates on the second and third floors of McConnell, with additional faculty labs in the basement.

- classroom/lecture spaces
- teaching labs
- faculty labs
- faculty offices
- storage rooms
- social/study spaces





Project Problem

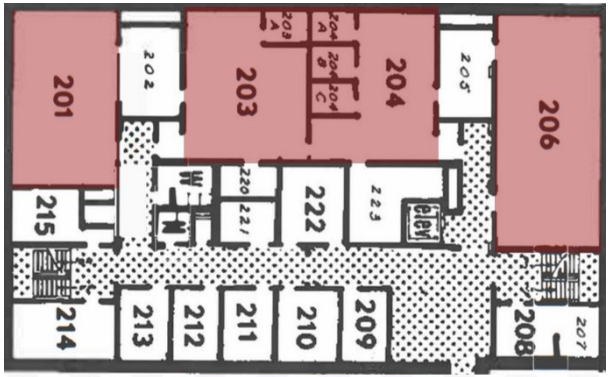
Research labs often require heavy equipment (optical tables, cryostats, etc.). There are building regulations for heavy machinery (floor thickness, etc.).

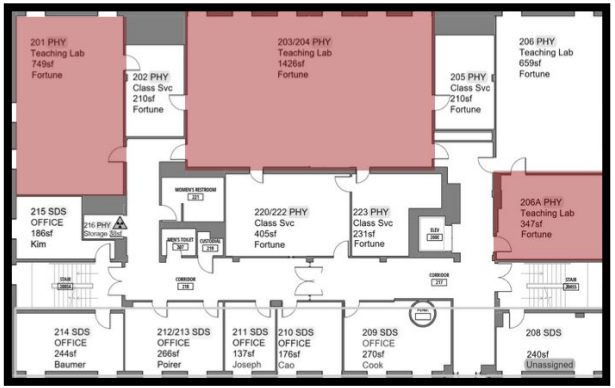
Is there any structural difference between rooms with different purposes in the physics department? (labs vs classrooms?)

Can we trace the history of a space by taking GPR data of its foundations?

What can we learn about 1960s-era building techniques?

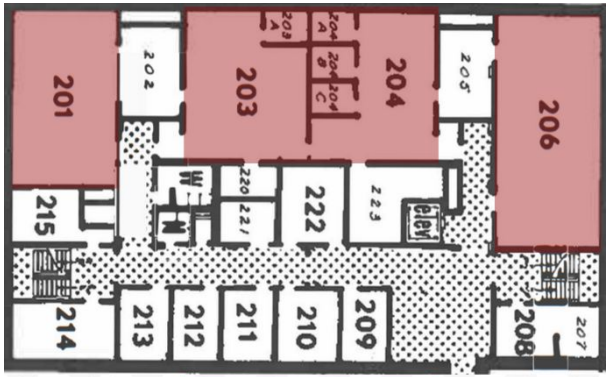
Site Conditions

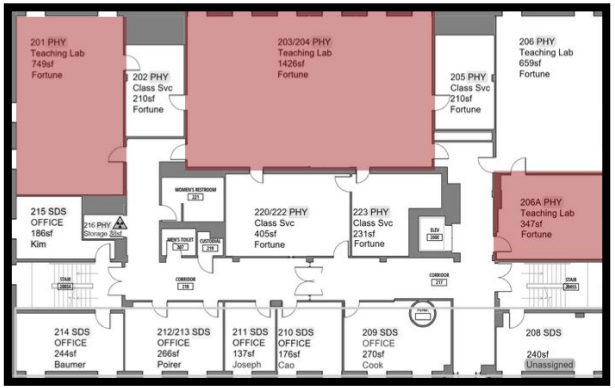




McConnell Hall, room 206 (ft. Ellie)

Site Conditions





McConnell Hall, room 201 (ft. Ellie)

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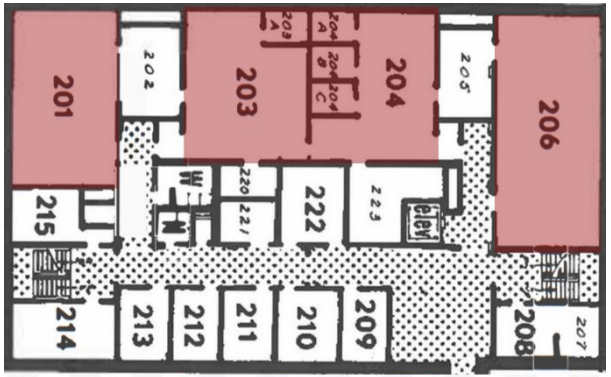
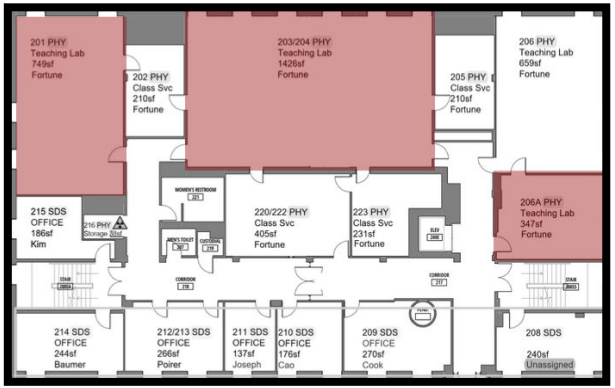




McConnell Hall, room 203/204 (ft. my thumb)

Fieldwork Summary

marked start and end of scans with tape

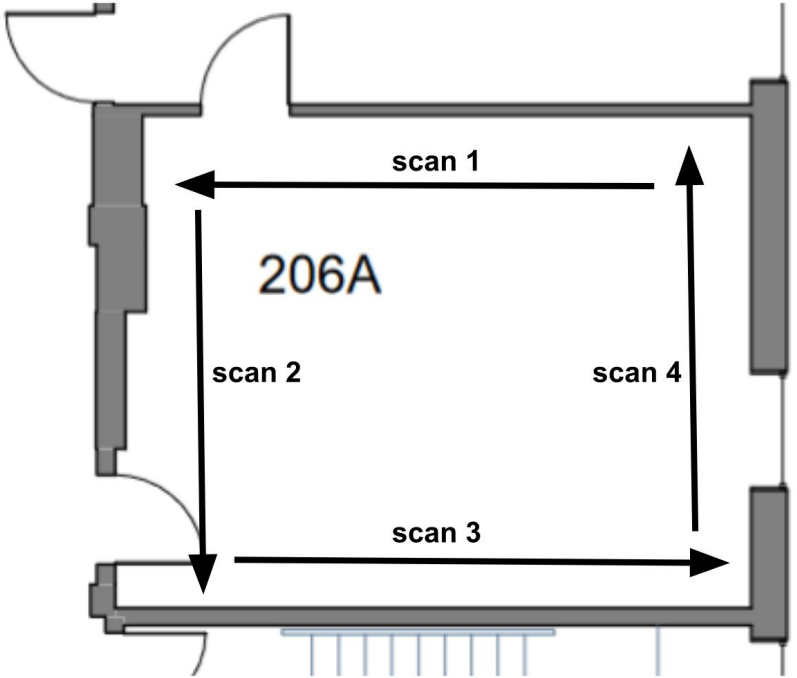
free-running scans with 900MHz antenna (finer resolution, not as much depth needed)

timed each scan

measured length traveled for each scan

measured distances from each start point to nearby walls (exact position in room)

measured dimensions of room



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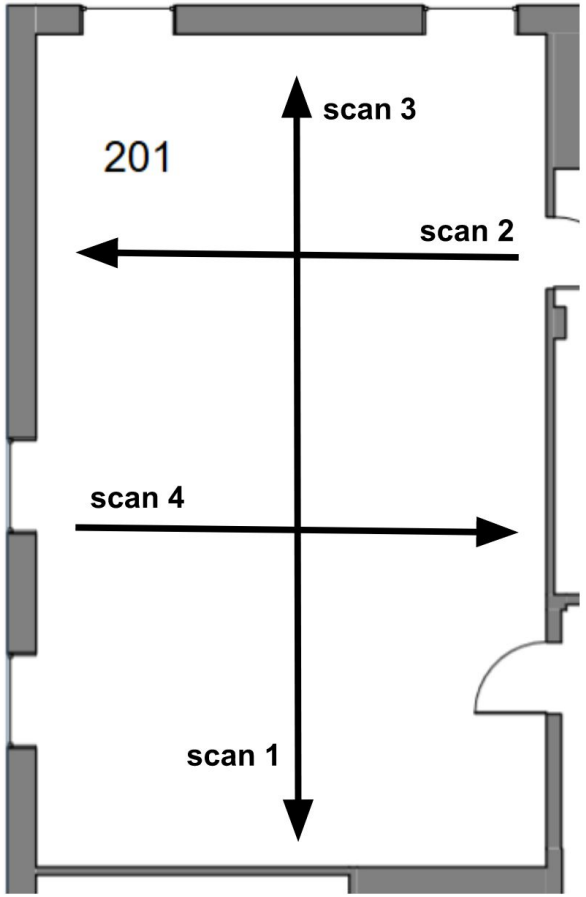

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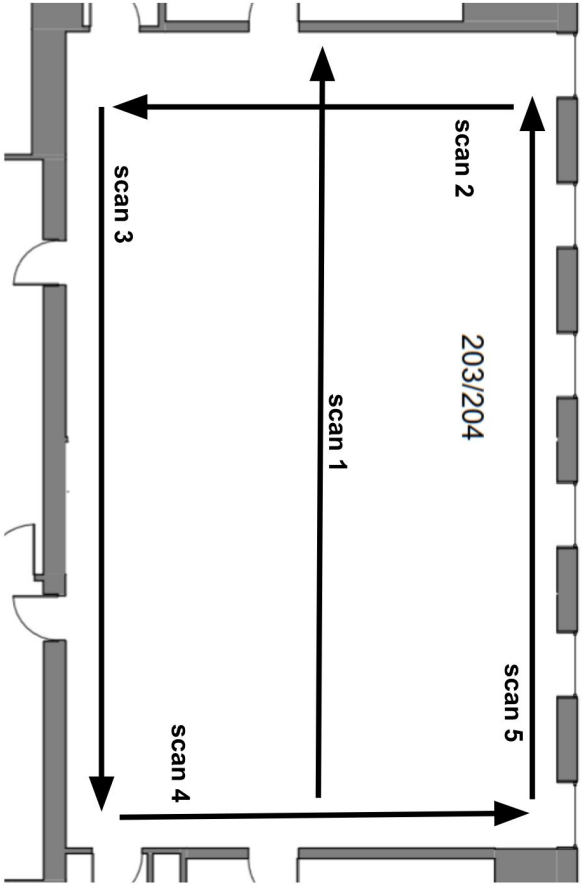

Data Summary

13 total scans, 4-5 scans per room

In-situ inspection of the data showed lots of rebar in room 206, and not much rebar in room 201 (though more around the edges).

Planned inspection of the data over the next few days:

- compare amount, position, depth of rebar in all three rooms
- look into any additional structures present in the data
- depths? assume same dielectric constant in each room

Lessons Learned

Life happens. Sometimes a lot of life happens all at once. When you're working on a project alone, there's no one to pick up your slack when unexpected life happens, and your project suffers as a result.

How to use a GPR unit! (turns out marching band skills are transferable)

Efficient use of time in the field - time setting up vs time taking data

Talk to your professors! There's a lot of cool history you won't find anywhere else

Conclusions - *Work is ongoing! Project is not yet concluded!*

Interviews w/ faculty → suggest few structural difference between rooms

Data → suggest structural difference between rooms on different sides of building

Ideas for future work:

- scan rooms on another floor of McConnell
- scan rooms in another building of the same era
- scan rooms in a more modern building

Acknowledgements

Tom Richardson for current building plans and historical information on original building plan

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