TESTING OF THE CARBON-NANOTUBE BASED WATER LEAK DETECTION SYSTEM

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WHAT IS IT?

- System for detecting water leaks in the LHC

WHY?

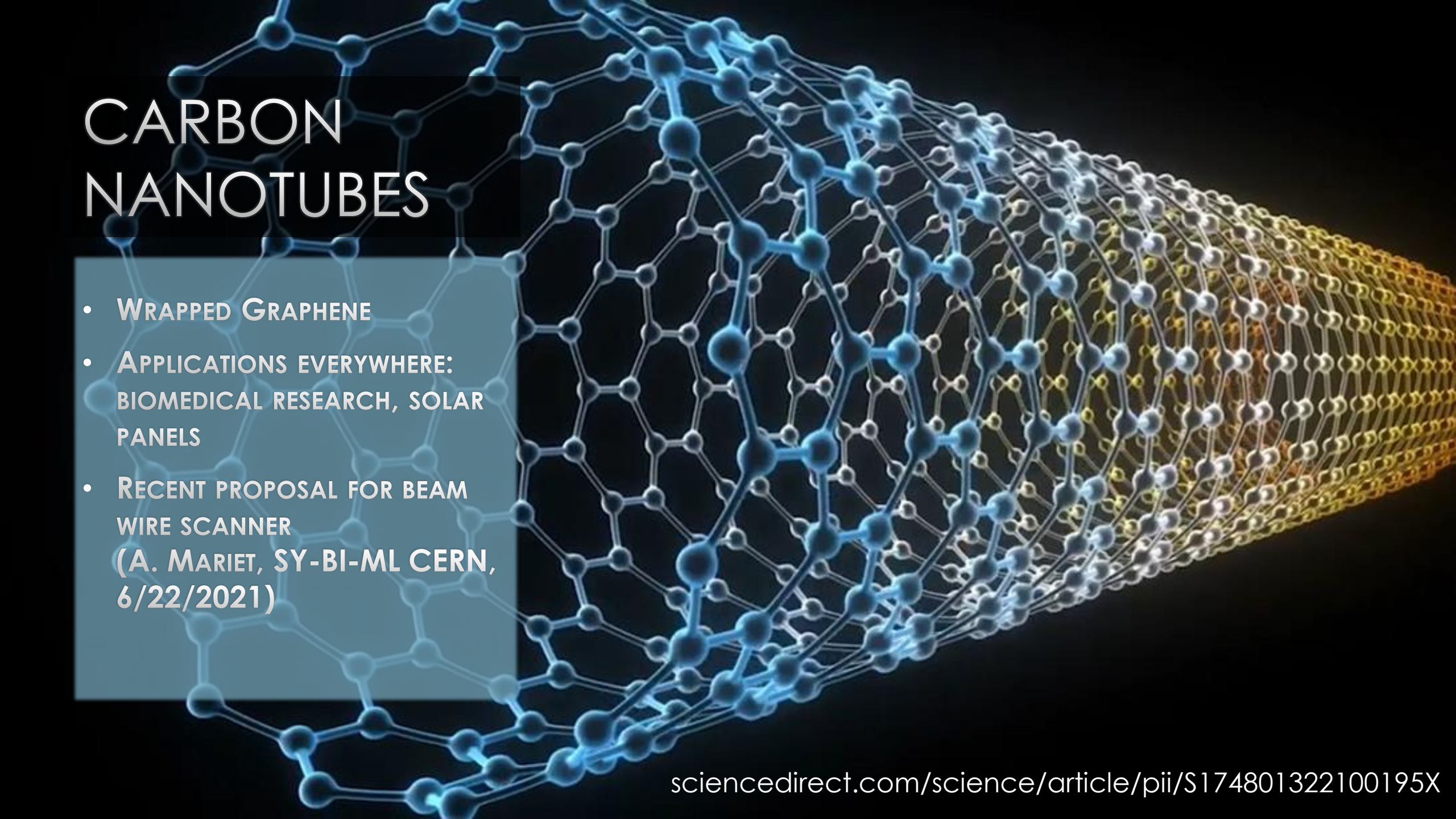
- Old system has limitations
- Improvement to better protect expensive electronics

WHAT IS OUR TASK

- UNDERSTAND BEHAVIOUR, TEST CONSISTENCY AS WELL AS RELIABILITY

CARBON NANOTUBES

- Wrapped Graphene
- Applications everywhere: biomedical research, solar panels
- Recent proposal for beam wire scanner (A. Mariet, SY-BI-ML CERN, 6/22/2021)



sciencedirect.com/science/article/pii/S174801322100195X

SETUP

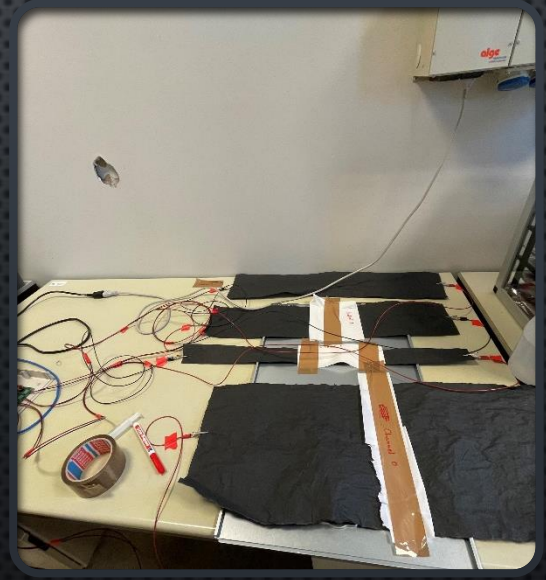
- RaspberryPi (Server)
- Client connects via ssh

TESTS

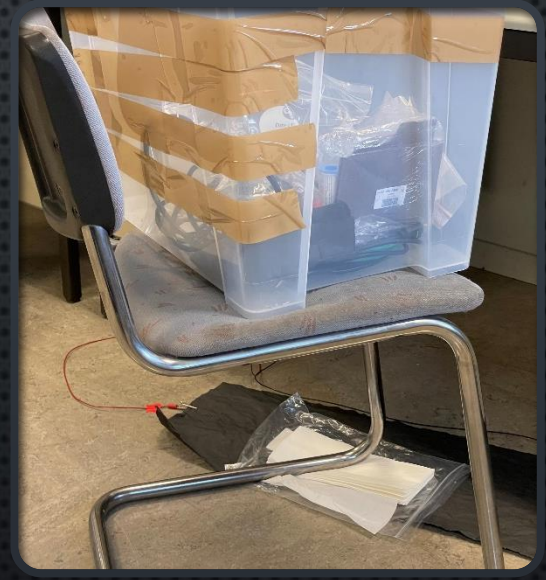
Water

Heat

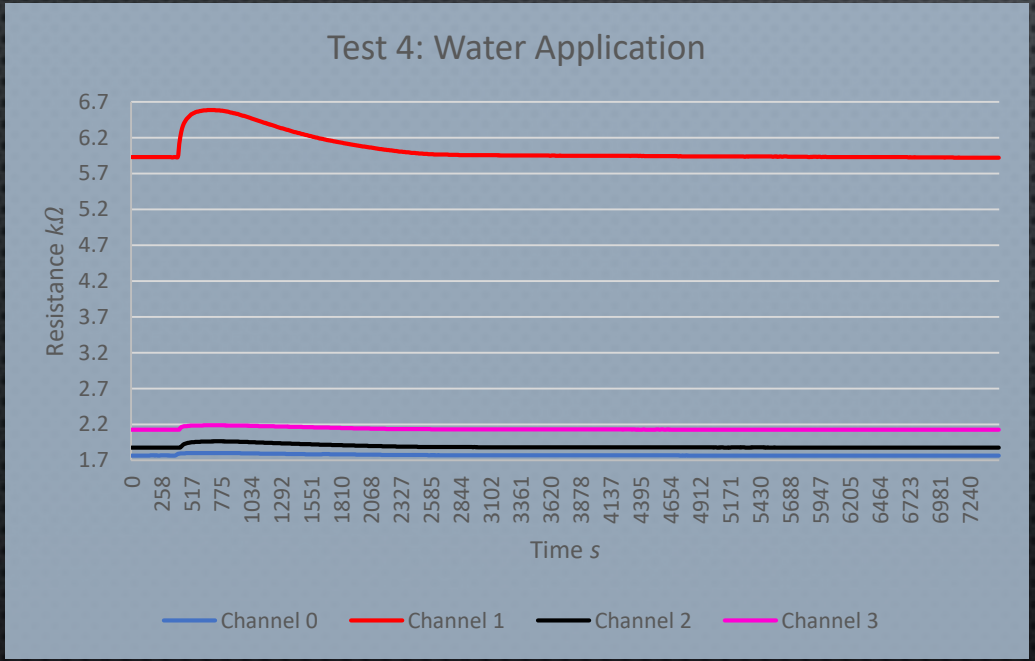
Metal

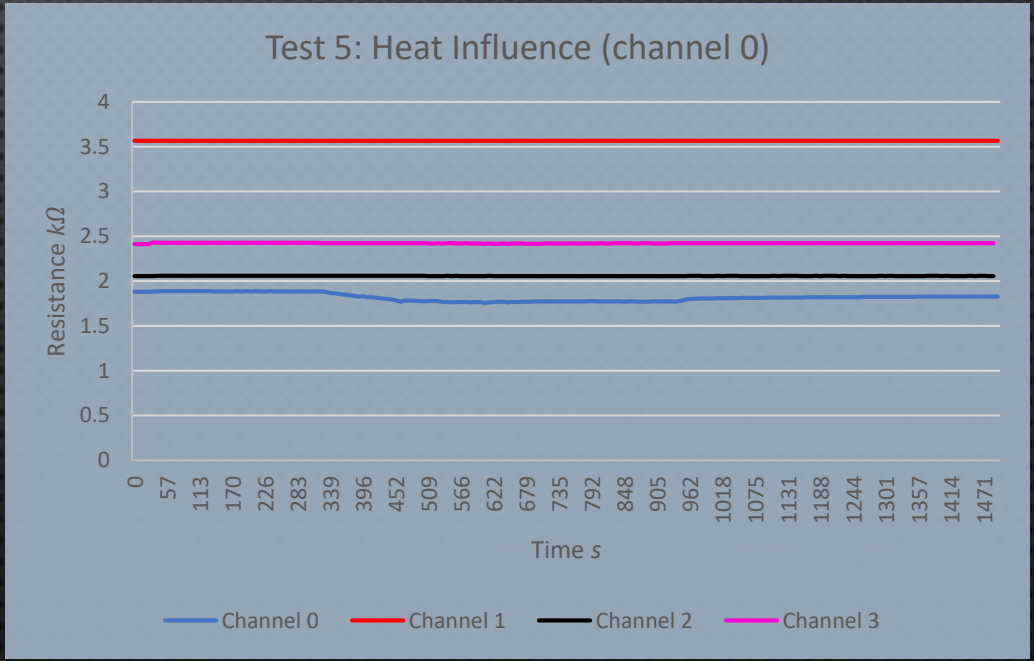


Pressure



RESULTS


Test 4: Water Application
Resistance kΩ
6.7
6.2
5.7
5.2
4.7
4.2
3.7
3.2
2.7
2.2
1.7
0
258
517
775
1034
1292
1551
1810
2068
2327
2585
2844
3102
3361
3620
3878
4137
4395
4654
4912
5171
5430
5688
5947
6205
6464
6723
6981
7240
Time s
Channel 0
Channel 1
Channel 2
Channel 3


Test 5: Heat Influence (channel 0)
Resistance kΩ
4
3.5
3
2.5
2
1.5
1
0.5
0
0
57
113
170
226
283
339
396
452
509
566
622
679
735
792
848
905
962
1018
1075
1131
1188
1244
1301
1357
1414
1471
Time s
Channel 0
Channel 1
Channel 2
Channel 3

DISCUSSION

- No false positive found!
- Water detection is reliant and consistent
- Relative amount of water is correlated to resistance change
- Measurement errors negligible

Difficulties

- Issues with channels 1&3
- Outputs max value (15-bit)

WHAT WE LEARNED

- Basic terminal navigation (bash)
- Prepare & execute test-setup
- Analyse, interpret & present data

THANK YOU!

- For your attention
- Ignacio, Carlos & Kaan
- The cosmological constant