

Measuring magnetic field

Can you find hidden magnets with your smartphone?



Turn on your smartphone's magnetic field sensor, for example via the phaeno Entdecker-App.

Guide the bar magnet vertically along the back of your smartphone and let the app show you the magnetic field strength in the z-direction. The magnet is very weak so that your magnetic field sensor is not overloaded or damaged.

Can you find out exactly where the sensor is located in your smartphone?

How does the measured signal change when aligning the magnet differently?

Can you find the two magnets hidden under the wooden plate using your smartphone? Attention: these magnets are stronger than the bar magnet!

Magnetic field sensors, so-called magnetometers are built into smartphones. They are used for example in navigation apps and allow you to use your smartphone as a compass. These sensors are hardly larger than a pinhead and are installed in different locations depending on the smartphone.

When selecting „Magnetfeld“ in the phaeno Entdecker-App and holding your smartphone to the magnet, the magnetic field strength will be displayed in micro-Tesla (μT) in the directions x, y, and z. This allows you to find out where in your smartphone the sensor is installed and how it is aligned. When moving the bar magnet along the back of your smartphone, the displayed magnetic field is strongest in the z-direction.

Smartphone magnetometers need to be very sensitive because the earth's magnetic field is relatively weak. In Wolfsburg it just barely measures $50\mu\text{T}$, i.e. 0.00005 T . Depending on the type of magnetometer, the maximum measurable field strength is often 2 mT , i.e. 0.002 T , with some devices measuring up to 5 mT . When a magnetic field sensor is overloaded, it usually needs some time before it can work normally again. Therefore, you should generally be careful with magnets near your smartphone.

When looking for the hidden magnets, your smartphone is safe, since the approximately 1 cm thick wooden plate is located between the magnets and your smartphone. Wood does not shield magnetic fields, but the strength decreases significantly just a few millimeters away from a magnetic pole.

Have you found the hidden magnets? They are located under the squares D4 and L7.