

# DHPT Temperature Sensing For Phase 2

Leonard Germic University of Bonn



## Why we cannot use the DHP Temp Sensor?

universität**bonn** 

- The DHP Temp Sensor needs a reference voltage
  - Nominal VDD=1.2V
- Problem: Sensing not working properly; value of VDD?
- Per design: The temperature has a linear dependency on VDD
- $T_{DHP}(VDD) = m \times VDD + b$ , m < 0



lgermic @uni-bonn.de



- Hybrid5.0.10 (DHPT1.1, DCDBv2)
- Temp Sensor has not changed since DHPTv1.0
- PT100 4-wire sensing
  - 100Ω @ 0° C
  - T(R) dependency







- Set chiller temperature from 0C to +50C (increment in 5K steps)
  - Measured T<sub>DHP</sub>(VDD) with Hybrid5 and 'true' T<sub>PT100</sub> with PT100
  - For each T<sub>DHP</sub>-curve one 'true' temperature is assigned





- Curve parameters  $T_{DHP} = b + m \times VDD$ 
  - Intercept b does not supply any information since real VDD unknown
  - Slope m <u>does</u> supply information, but errors are to large!





- Calibration curve for T<sub>DHP</sub> vs T<sub>PT100</sub> @VDD=1.2V
  - $T_{DHP}(T_{PT100}) = 12.0(3) + 1.07(3) \times T_{PT100}$
  - Offset of +12C : DHP temperature measurement returns higher values



## Conclusion



- DHP temperature read-out withou VDD sensing not possible
- DHP temperature calibration yields offset of +12C @ VDD=1.2V
- DHP temperatures measurements returns higher values
  - Due to voltage drop the DHP temperature measurement returns significantly higher values than the real temperature.



Overestimation ->