DCS module for ambient BTF readout

At BTF used memcache server **testchaos.lnf.infn.it** to store ambient sensor values from the Comet T7510 weather station in the hall.

The meteo data file fetched from Comet T7510 sensor are saved in this format (comma value separated):

 1 => seconds since 1970-01-01 00:00:00 UTC
 2 => temperature [Celsius degrees]
 3 => relative humidity [%]
 4 => pressure [mb]
 5 => year-month-day hour:minutes:second in UTC format

Written and implemented in padme-dcs new module **BTF_Amb** to directly fetch this values from memcache server : the content of the BTF_ptuhall key sent to DCS is
1512575461,15.6,43.1,1009.5,2017-12-06 15:51:01

For this and the beam LINAC readout many thanks to L. Foggetta

DCS module for LNF LINAC status readout

At BTF used memcache server **plbtfhactr001.lnf.infn.it** to store LINAC parameters in the BTF DAQ

Example row of the datastream (\n unix terminated) keyvalue key :

1 73 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
16375 8471 0 10 18775 19964 42 314 134 1065 106 816 106 833 151 1180 134 1034
145 1168 30 251 131 1038 134 1076 159 1231 154 1232 146 1118 164 1262 141 1118
149 1182 0 -1697888 165123 1 1 1

For our purposes the significant data are the last words of the buffer :
0 -1697888 165123
*   0 every time,
* -1697888 ms clock count of BTFDAQ processor,
* 165123 is the local time (GMT +1) in the format HHMMSS
==> from latest attempts on padmelab1 it seems that this last word is NOT a local time stamp
1 1 1
* electron/positron LINAC phase (0/1)
* modulator on/off(1/0)
* gun on/off(1/0)

Written and implemented in padme-dcs new module **BTF_Beam** to read the keyvalue key and get the last 4 values with a local timestamp :
the content of the part of the keyvalue sent to DCS is
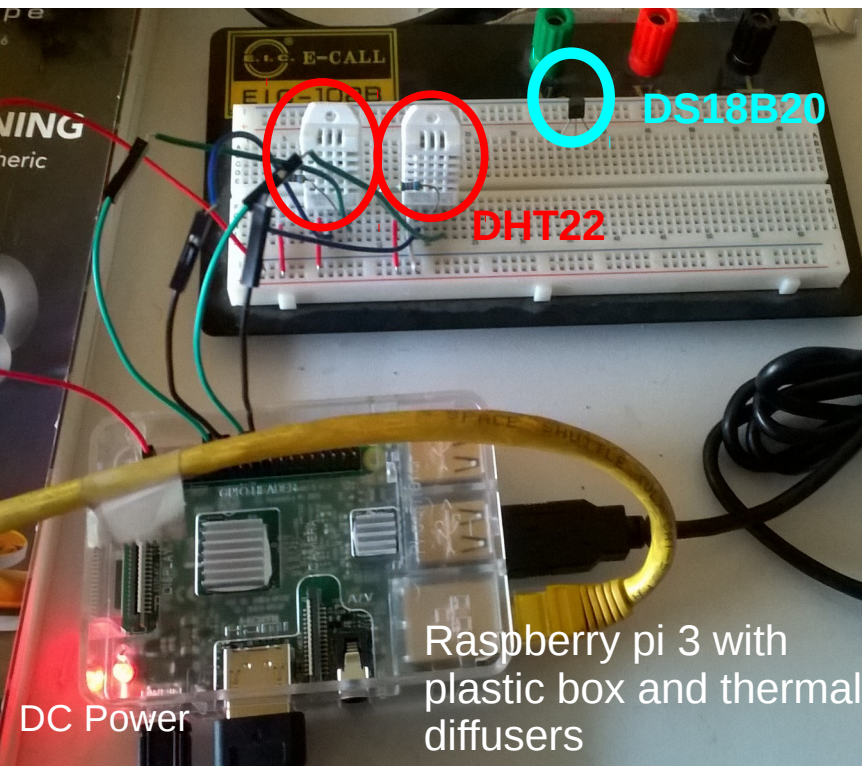Fri Mar 2 14:28:06 2018 165123 1 1 1

Inquiring with L. Foggetta how to get more LINAC beam parameters

DCS module for Padme PMT sensors readout

DHT22 temperature and relative humidity sensors
- Output signal digital via 1-wire bus ; resolution 16 bits
- Long transmission distance possible , up to 100 m
Supply Voltage   :   +3.3 - +5.5 V
Operating range   : - humidity 0-100% RH   - temperature -40~80 ºC
Accuracy   : - humidity ±2% RH (Max ±5% RH)   - temperature ± 0.5 ºC
Resolution sensitivity   : - humidity 0.1%RH   - temperature 0.1 ºC

DS18B20

DHT22

Raspberry pi 3 with plastic box and thermal diffusers

DC Power

DHT22 #1   DHT22 #2
R/out GPIO 25   R/out GPIO 23
Common V : 3.3 V from Raspberry Pi

DHT22 readout using a C program via pigpiod daemon
1 r/out every 2/3 secs possible
Socket call in server program to send values to DCS

Written and implemented in padme-dcs new module
PADME_Amb to read the server data into DCS :
Timestamp for each call *(NTP synchronized Rasp pi)*
+ for each sensor :
Gpio# Temp [ºC] Rel Humidity [%] dew point [ºC]*
Fri Mar 2 15:26:53 2018 23 21.6 41.00   7.9 25 22.1 40.80   8.3
* dew point calculated on raspberry server

Raspberry pi 3 mounted and enabled with Raspbian 9.1 (Full fledged Debian) - Cabled Ethernet connected
Working headless – remote control via ssh and/or VNC
gcc/g++ compilers + DHT22 S/W with the new breadboard + cabling

Stability of Padme Ambient sensors

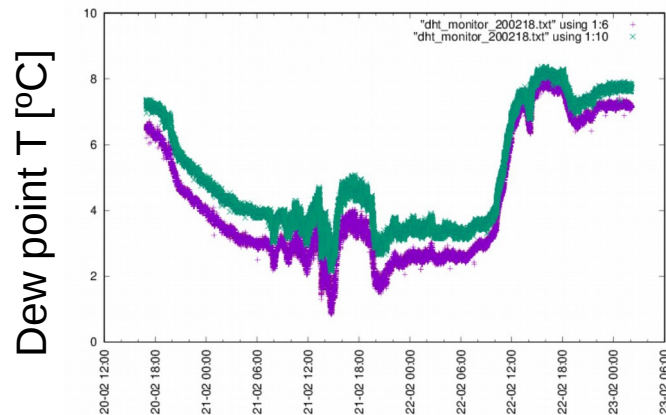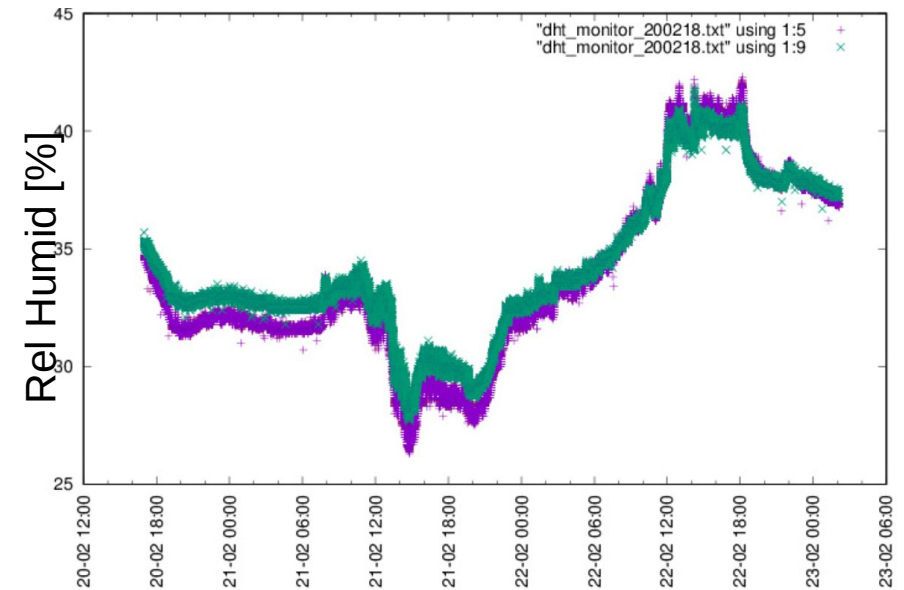Tested for 3 days 3*ds18b20 (series) and 2*DHT22 (independent) using Raspberry Pi 3 in my office

Very good stability – ds18b20 calibrated at 0.1 ºC level – OK 1 DHT22
1 DHT22 lower by ~ 0.6-0.7 ºC – but follows other very closely → just need to recalibrate
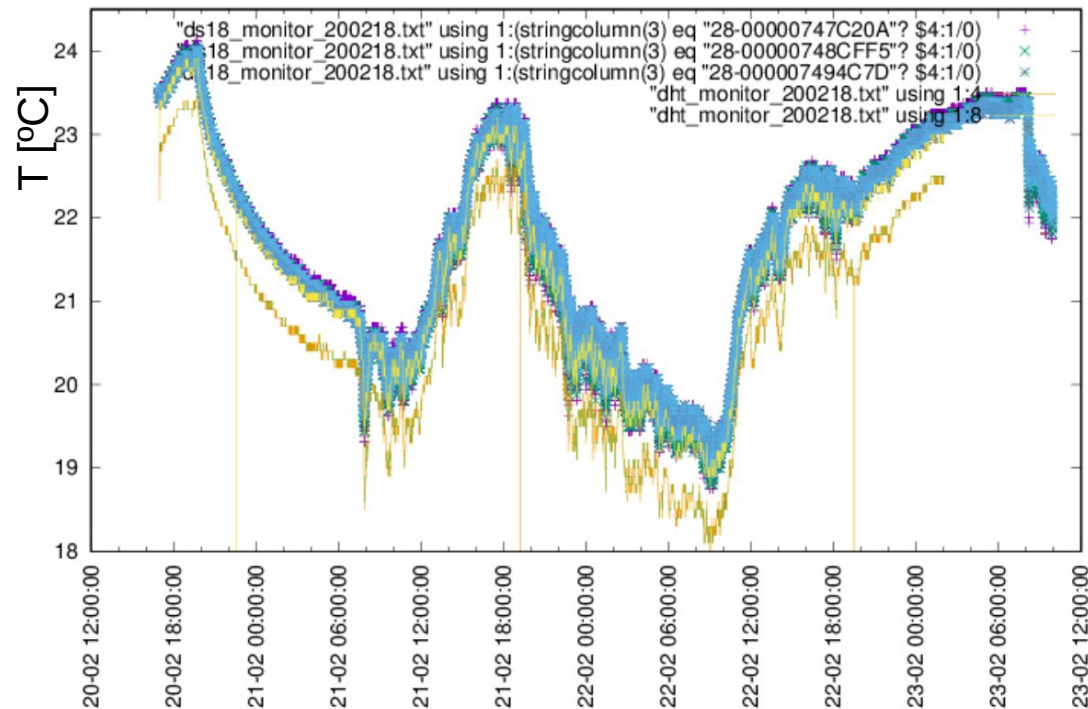
Very good stability
DHT22 calibrated at ± 2% as quoted

We can keep very well under control
the dew point T inside the PMT box

Important if we want to avoid problems with
PMT dividers

BACKUP

CABLE length problem for DHT 22

Solutions are available around : see the following found on the network

"I received a question about maximum wire length between the Pi and the DHT22 sensor. The datasheet states the maximum wire length is 100 meters. I think this is very optimistic.
Distances greater than 100cm requires 5V, so it is necessary to use a level shifter on the data line to lower the 5V down to a Pi friendly 3.3V.
 I recommend using a level shifter with a FET design such as the Adafruit 4 channel BSS138.
I found the TXB104 shifters unreliable with the DHT22.
I performed a test at **20 meters distance and got reliable results** using
CAT6E 550Mhz 23AWG network cable (1 pair for 5V and ground and another pair for data and ground.)
I also lowered the resistor value down to 4.7K Ω. Here's a schematic: "