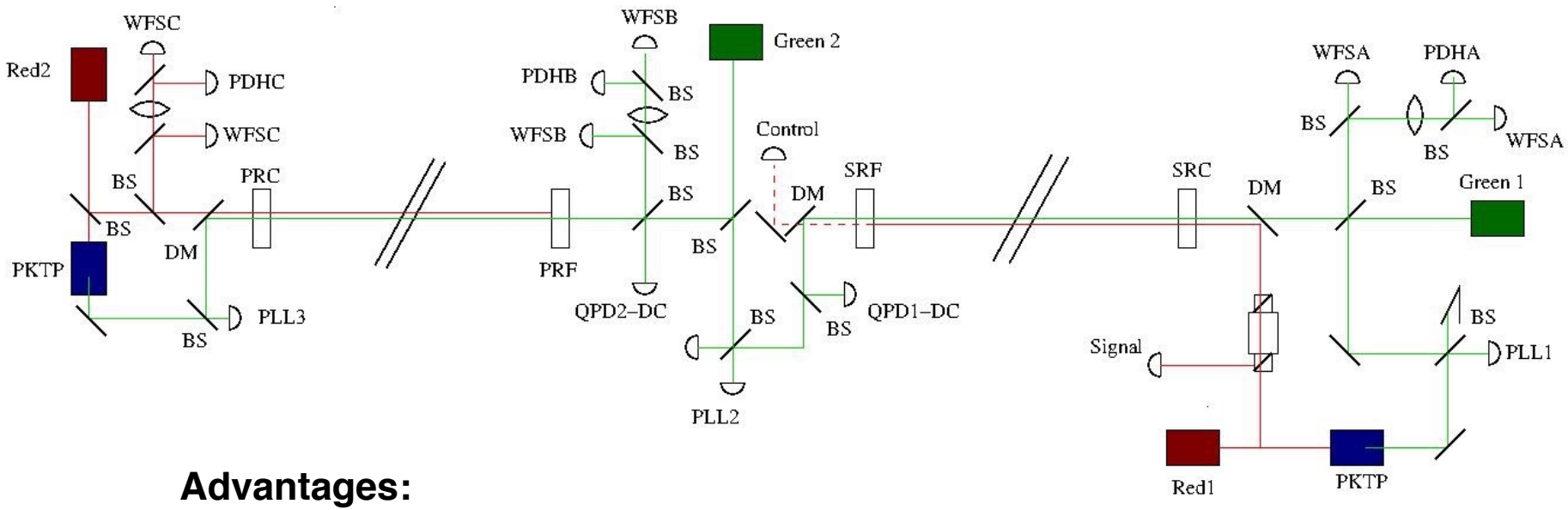
Improvements of new design proposal

HELMHOLTZ ASSOCIATION

DESY

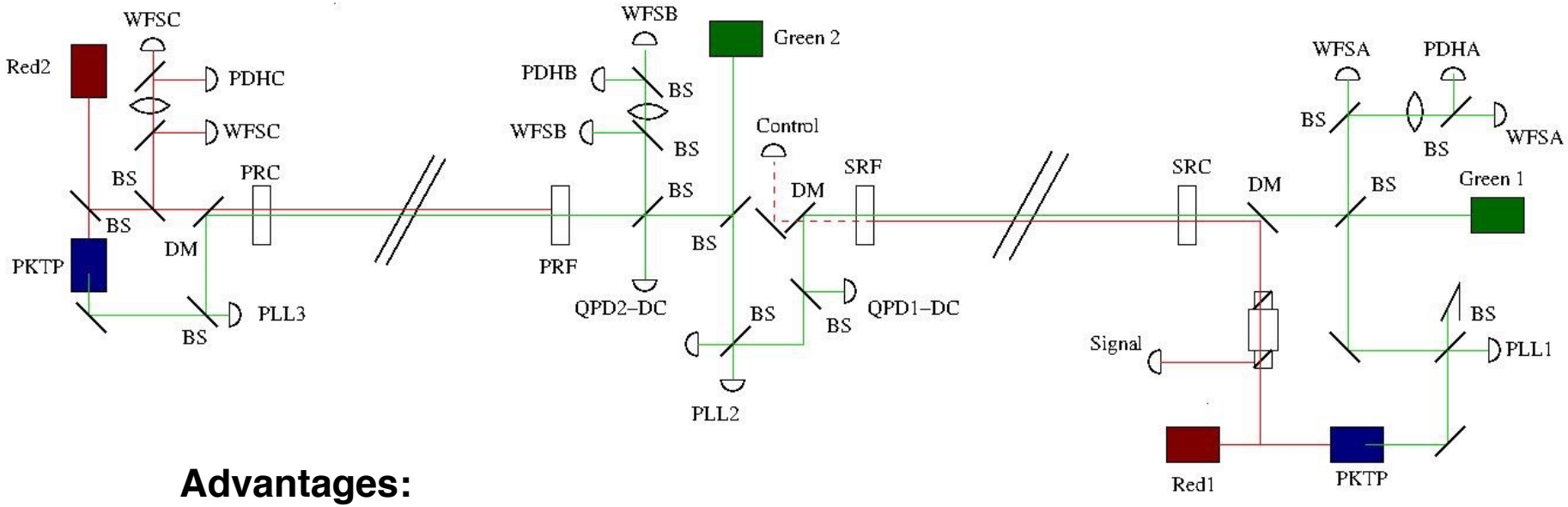


Advantages:

- **Signal as far separated from power laser as possible**
  - **SRF/PRF should be as HR for IR as possible**
- **Easy to switch from TES to heterodyne**
- **Check Red2 resonant on SR: Just set the offset PLLs to ensure that Red1 and Red2 operate on same frequency for the check only.**

Disadvantages: ??

- **Need to check if coherence is maintained for heterodyne.**
- **Need to maintain phase coherence for the RF-signals used to drive PLLs**



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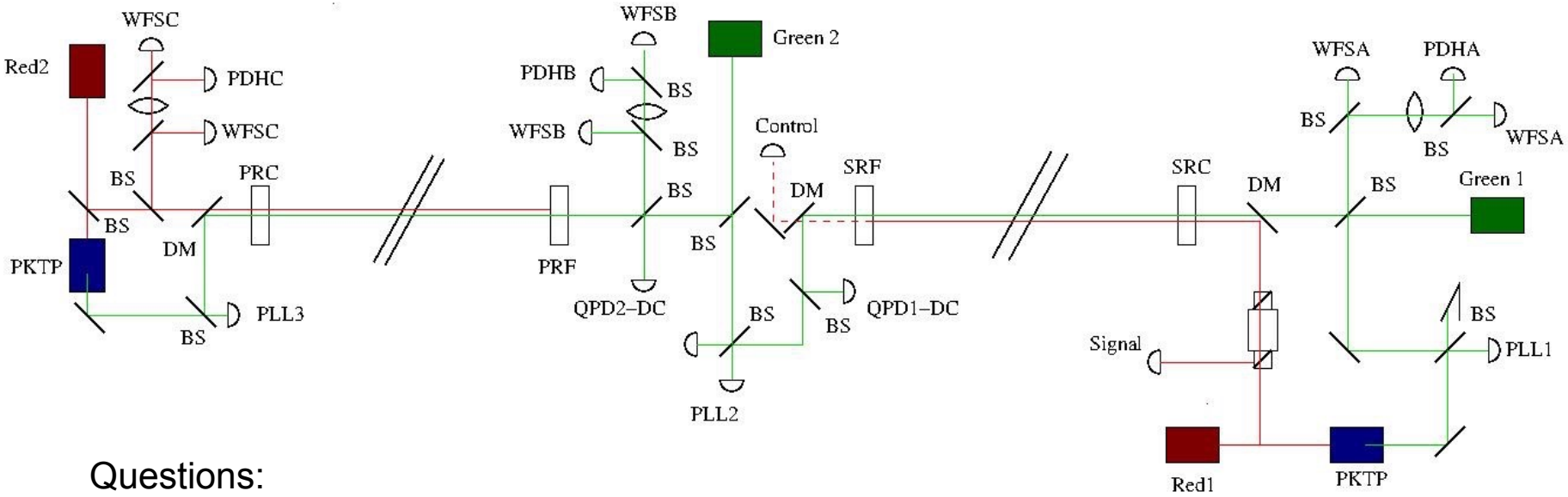
- both cavities can be locked individually
- kicker bypass most likely easier to implement
- no strong dependence on power of transmitted light through PC
- light tightness for shutter box easier
- no AOM on central table
- no central table?



Questions:

- requirements for Green2 and Green1?
- where to turn the polarization to switch search modes (scalar vs. pseudo-scalar)?
- DWS on central table required?

Improvements/modifications

- we are not in favor of a length lock of both cavities
- regeneration cavity length lock preferable
  - due to larger linewidth for green
- Green 1 should not be the main reference; Instead PC should be main reference
- we need a direct path to confirm the spatial overlap of the cavity modes and prove that IR light is resonant in the regeneration cavity
- we would like to keep the CBB as simple as possible
  - do we need Green2 at all?
  - the shorter the distance between the two cavity mirrors the less impact of thermal expansion of the CBB
- frequency doubling crystal in main beam path and LBO?