

CLAIMS

1. A control arrangement (100) for providing a plurality of phase-coherent oscillating signals, the control arrangement (100) comprising:

- 5 - a reference clock input arrangement for providing a high-frequency reference clock signal,
- a plurality of modules (130) each comprising a plurality of channels (160) for providing the plurality of phase-coherent oscillating signals,
- 10 - a first distribution arrangement (140) for distributing the high-frequency reference clock signal in a phase-coherent manner to the plurality of modules (130),
- within each of the plurality of modules (130) a
- 15 second distribution arrangement (150) for distributing the high-frequency reference clock signal in a phase-coherent manner to the plurality of channels (160) of the respective module (130), and
- within each of the plurality of channels (160) a
- 20 first phase-locked loop (162) configured to upconvert the high-frequency reference clock signal for providing one of the plurality of phase-coherent oscillating signals.

2. The control arrangement (100) according to claim 1, wherein the reference clock input arrangement comprises:

- 25 - a reference clock signal input (110) for providing an initial reference clock signal; and
- an initial phase-locked loop (120) coupled to the
- 30 reference clock signal input (110) and configured to upconvert the initial reference clock signal for providing the high-frequency reference clock signal.

3. The control arrangement (100) according to claim 1 or 2, wherein reference clock input arrangement

35 claim 1 or 2, wherein reference clock input arrangement

comprises a motherboard arrangement (104) and wherein each of the plurality of modules (130) comprises a circuit board (132).

4. The control arrangement (100) according to
5 any of the preceding claims, wherein reference clock input arrangement comprises a motherboard arrangement (104) and wherein the plurality of modules (150) is arranged for pluggable coupling to the motherboard arrangement (104).

10 5. The control arrangement (100) according to any of the preceding claims, wherein each of the plurality of modules (130) comprises a plurality of shields (190) for radio-frequency (rf) shielding of each of the plurality of channels (160) of the respective module
15 (130).

6. The control arrangement (100) according to any of the preceding claims, when dependent on claim 2, wherein the initial reference clock signal has a frequency of 5-50 MHz.

20 7. The control arrangement (100) according to any of the preceding claims, wherein the high-frequency reference clock signal has a frequency of 100-250 MHz and/or the plurality of phase-coherent oscillating signals has a frequency of 1-15 GHz.

25 8. The control arrangement (100) according to any of the preceding claims, wherein the amplitude and/or frequency of at least one of the plurality of phase-coherent oscillating signals is adjustable by a digital control signal for the respective channel.

30 9. The control arrangement (100) according to any of the preceding claims, comprising a control connection for remote adjustment of the frequency and/or

amplitude of the plurality of phase-coherent oscillating signals.

10. A generator arrangement (300) for providing a plurality of phase-coherent oscillating signals,
5 the generator arrangement (300) comprising the control arrangement (100) according to any of the preceding claims and a reference clock generator (10) arranged for providing a reference clock signal for providing the high-frequency reference clock signal.

10 11. A quantum computing arrangement comprising a control arrangement (100) according any of claims 1-9 and a quantum computing system (20), wherein the control arrangement (100) is coupled to the quantum computing system (20) for providing a plurality of phase-
15 coherent oscillating signals for the quantum computing system (20).

12. A method (200) for providing a plurality of phase-coherent oscillating signals, the method comprising:

- 20 - receiving (230) a high-frequency reference clock signal,
- distributing (230) the high-frequency reference clock signal in a phase-coherent manner to a plurality of modules,
25 - within each of the plurality of modules distributing (240) the high-frequency reference clock signal in a phase-coherent manner to a plurality of channels of the respective module, and
- within each of the plurality of channels upcon-
30 verting (250) the high-frequency reference clock signal for providing one of the plurality of phase-coherent oscillating signals.

13. The method according to claim 12, comprising:
35 ing:

- receiving (210) an initial reference clock signal,
and
- upconverting (220) the initial reference clock
signal for providing the high-frequency reference
clock signal.

14. The method according to claim 13, wherein
the initial reference clock signal has a frequency of
5-50 MHz.

15. The method according to any of claims 12-
14, wherein the high-frequency reference clock signal
has a frequency of 100-250 MHz and/or the plurality of
phase-coherent oscillating signals has a frequency of
1-15 GHz.

16. The method according to any of claims 13-
15, comprising adjusting the amplitude and/or frequency
of at least one of the plurality of phase-coherent os-
cillating signals by a digital control signal for the
respective channel.