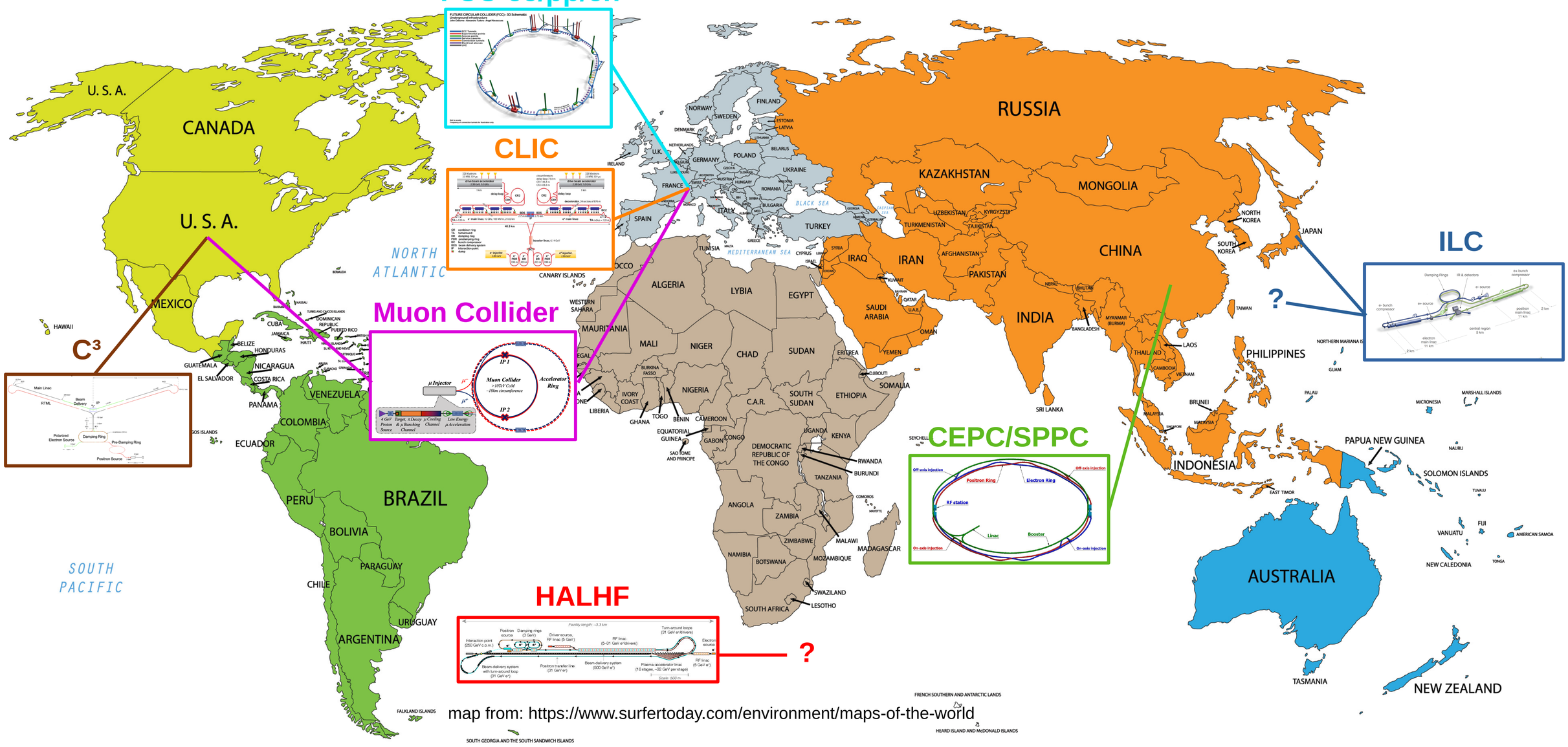
The Landscape of Future Colliders



Linear or circular — / ○

Circular: circle particles around, reuse them for maximum reaction rate, but lose energy in bends, limited maximum energy

Linear: use particles once, lower reaction rate, but higher maximum energy

Precision frontier: electron-positron collider Higgs factories $e^- e^+$

Collide particles that are

- anti-particles of each other → annihilate into energy for reaction
- elementary particles → all kinetic energy goes into the reaction, few uninteresting reactions
- light → easier to manipulate, but lower maximum energy

Energy frontier: proton collider or muon collider $p^+ p^+$ / $\mu^+ \mu^-$

Collide particles that are heavy → higher maximum energy, stronger magnets necessary

- but compound → only part of energy goes into reaction, many uninteresting reactions with need to filter
- or unstable → tricky to achieve high reaction rates / large statistics

	Shape	Particles Used	Proposed Location
International Linear Collider **ILC**	—	$e^- e^+$	Japan, possibly CERN or USA
Compact Linear Collider **CLIC**	—	$e^- e^+$	CERN (Switzerland)
Future Circular Collider **FCC-ee**	○	$e^- e^+$	CERN (Switzerland)
Circular Electron-Positron Collider **CEPC**	○	$e^- e^+$	China
Cool Copper Collider **C³**	—	$e^- e^+$	Fermilab (USA)
Hybrid Asymmetric Linear Higgs Factory **HALHF**	—	$e^- e^+$	open
Future Circular Collider **FCC-hh**	○	$p^+ p^+$	CERN (Switzerland)
Future Circular Collider **FCC-eh**	○	$e^- p^+$ / $e^- A^{n+}$	CERN (Switzerland)
Super Proton-Proton Collider **SPPC**	○	$p^+ p^+$	China
Muon Collider	○	$\mu^+ \mu^+$	Fermilab or CERN?