Comparison of Radon detection principals

The following table shows the physical properties of the several detection principals used for continuous Radon measurements:

	HV-collection with Alpha Spectroscopy	**Ionisation chamber**	**Lucas-cell with PMT (Photo Multiplier)**
Long term contamination by Po-210 accumulation (Background activity)	NO	YES	YES
Thoron-Interference, Short term contamination by Po-212/Bi-212	NO	if Thoron enters the measurement chamber (e.g. by pump, fast diffusion)	if Thoron enters the measurement chamber (e.g. by pump, fast diffusion)
simultaneous Radon/Thoron measurements	YES	limited possible only with **multi-wire ionisation chambers** at lower concentration levels (pulse mode)	NO
Fast step response (recovery) by Po-218 separation	YES	possible only with **multi-wire ionisation chambers** at lower concentration levels (pulse mode)	NO
Background by external radiation, spontaneous ionisation	NO	YES	NO
maximum obtainable sensitivity, same active chamber volume assumed *)	30%	67% < 20% with **multi-wire ionisation chambers** providing spectroscopy mode	nearly 80% with small chambers
Counting measurement over the whole range	YES	NO (switches over from pulse mode to current mode at a few kBq)	YES
Quality assurance at physical level	YES (correct shaped spectrum indicates an 100% correct measurement)	NO	No
Detection limits	very low because no background compensation is required	Increasing with increasing Po-210 contamination and increasing external radiation	electronic background of the PMT, increasing with increasing Po-210 contamination

*) 100% are related to the detection of all decays of all nuclides which can be used for the Radon detection (Rn-222, Po-218, Po-214)