WOPM 2023 Magnetometer Enabling Technology Survey

Date here

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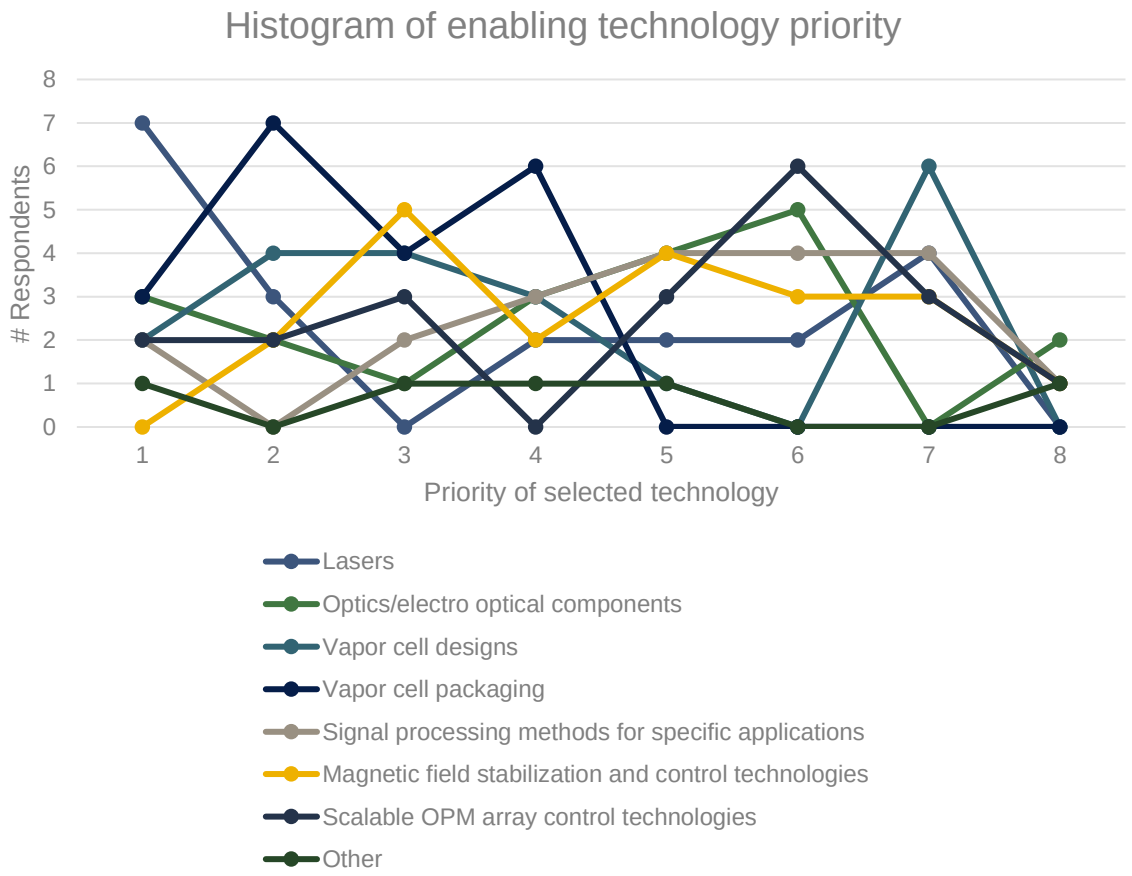
Question 1

Please rank the impact investments in component technologies could have on the OPM community by dragging the most impactful technologies to the top. Quantitative specifications/requirements are essential to determining the development of new technologies, add specifications and any other desired comments for the top technologies in the adjacent text box.

Lasers	
Optics or electro-optical components	
New vapor cell designs	
Vapor cell packaging and manufacturing methods	
Signal processing methods for specific applications (biomagnetism, geomagnetism, etc.)	
Magnetic field stabilization and control technologies	
Scalable OPM array control technologies	
Other (please specify)	

Question 1 - Results

Please rank the impact investments in component technologies could have on the OPM community by dragging the most impactful technologies to the top. Quantitative specifications/requirements are essential to determining the development of new technologies, add specifications and any other desired comments for the top technologies in the adjacent text box.



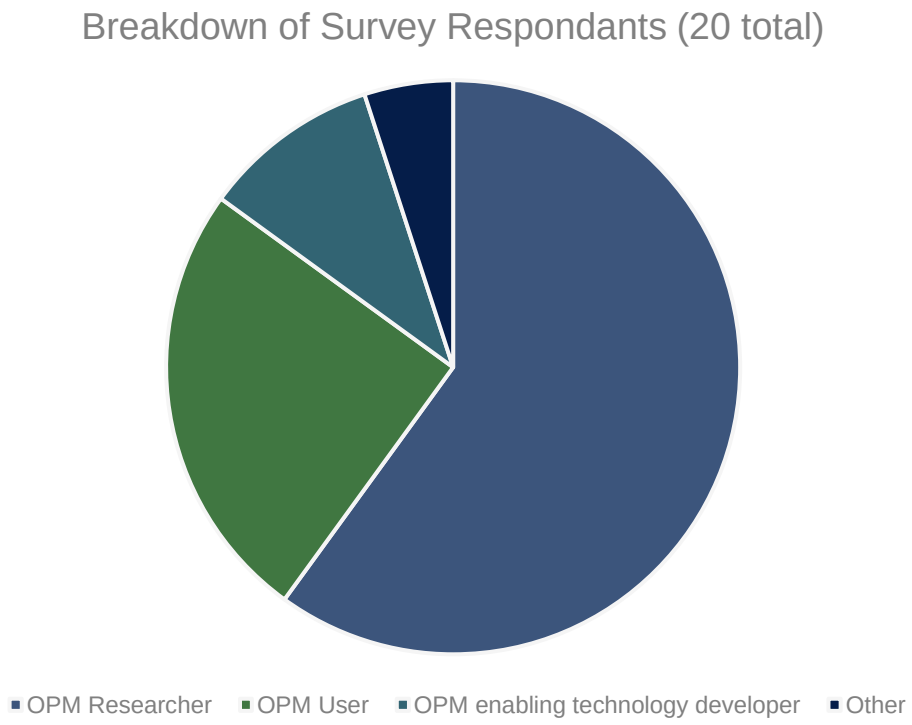
	Average Priority	# in top 3
Vapor cell packaging	2.65	14
Lasers	3.55	10
Vapor cell designs	4.05	10
Magnetic field stabilization and control technologies	4.7	7
Scalable OPM array control technologies	4.75	7
Optics/electro optical components	4.4	6
Signal processing methods for specific applications	5	4
Other	7.8	2

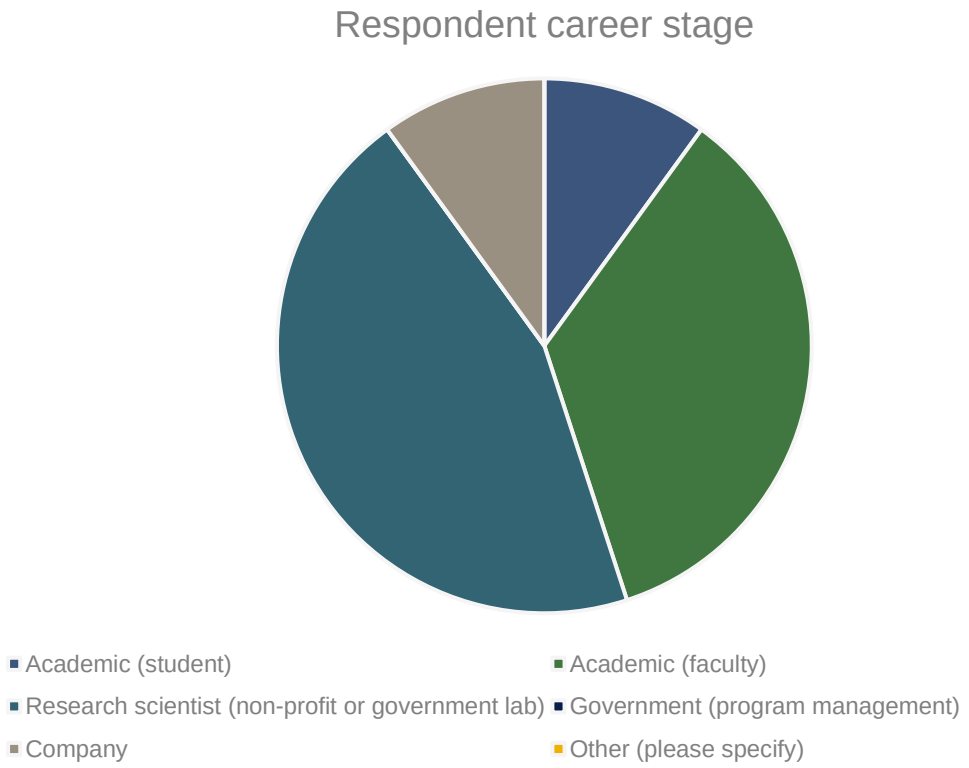
Vapor cell packaging, designs, and lasers most selected

Question 1 – Comments made in form

Enabling Technology	All Comments							
Lasers	VCSELs: 2 mW preferably 10 mW, 795 and 780 nm, near shot noised limited performance. DFB lasers that cost $1000. Lasers for pulsed optical pumping: 500 mW at 795 or 770 nm, linewidth; 1 GHz, repeatable power and wavelength.	The lack of VCSELs in the UK, and the struggles in mass-producing them, is proving to become problematic for OPM development.	prefer to have multi VCSEL sources. 1k/year now, potentially 100k/year in 5 years.	the laser frequency typically fluctuates by 50 MHz in a day	mWs, single mode	low-nose	high power vcsel	More compact high powered lasers
Optics/electro optical components	Extreme miniaturization for shuttering, amplitude control, and frequency modulation.	intergrated photonic systems, e.g. laser and cells	low-magnetization and high-bandwidth	miniaturized				
Vapor cell designs	Optical coating on the interior surfaces, both AR and HR. Operable up to 200 C for potassium. Sizes ranging from 1 mm^3 to 50 cm^3. Ensure long lifetime of the alkali metal at high temperature.	Vapor cells are the decicive component for the performance of an OPM. Miniaturization is important	increase the number of atom and decrease the size of the cell	intra-cell optical elements and coatings	cell is the most important component	more compact	miniturized	
Vapor cell packaging	Better thermal insulation. Maintain cell at 150 C for less than 500 mW of power.	High temperature paraffin coating	every bit of reduction in standoff helps	alkali+buffer gas cells with vacuum package	spin protecting cell coating	without glue	variable volume	Labs without cell fabrication could enter the field
Signal processing methods for specific applications	inverse problem							
Magnetic field stabilization and control technologies	For applications off the shelf products would lower development time	Larger dynamic range and mitigation of CAPE	high-stabilization current source	active noise compensation				
Scalable OPM array control technologies	>100 sensors	considering the cross-talks	Flexible standard electronics would lower costs					
Other	New Sensor Architectures - Dead Zone Free Operation, Low Heading Error, Higher Bandwidth/Dynamic Range etc.	detect high frequency brain signals (70-8,000 Hz)	Improving OPM dynamic range & noise	more attention to long-term stability	turnkey multi-opm-systems			

Respondent data





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