

# International Spallation Ultracold Neutron Source



Spokespeople: Y. Masuda (KEK), J.W. Martin (Winnipeg)

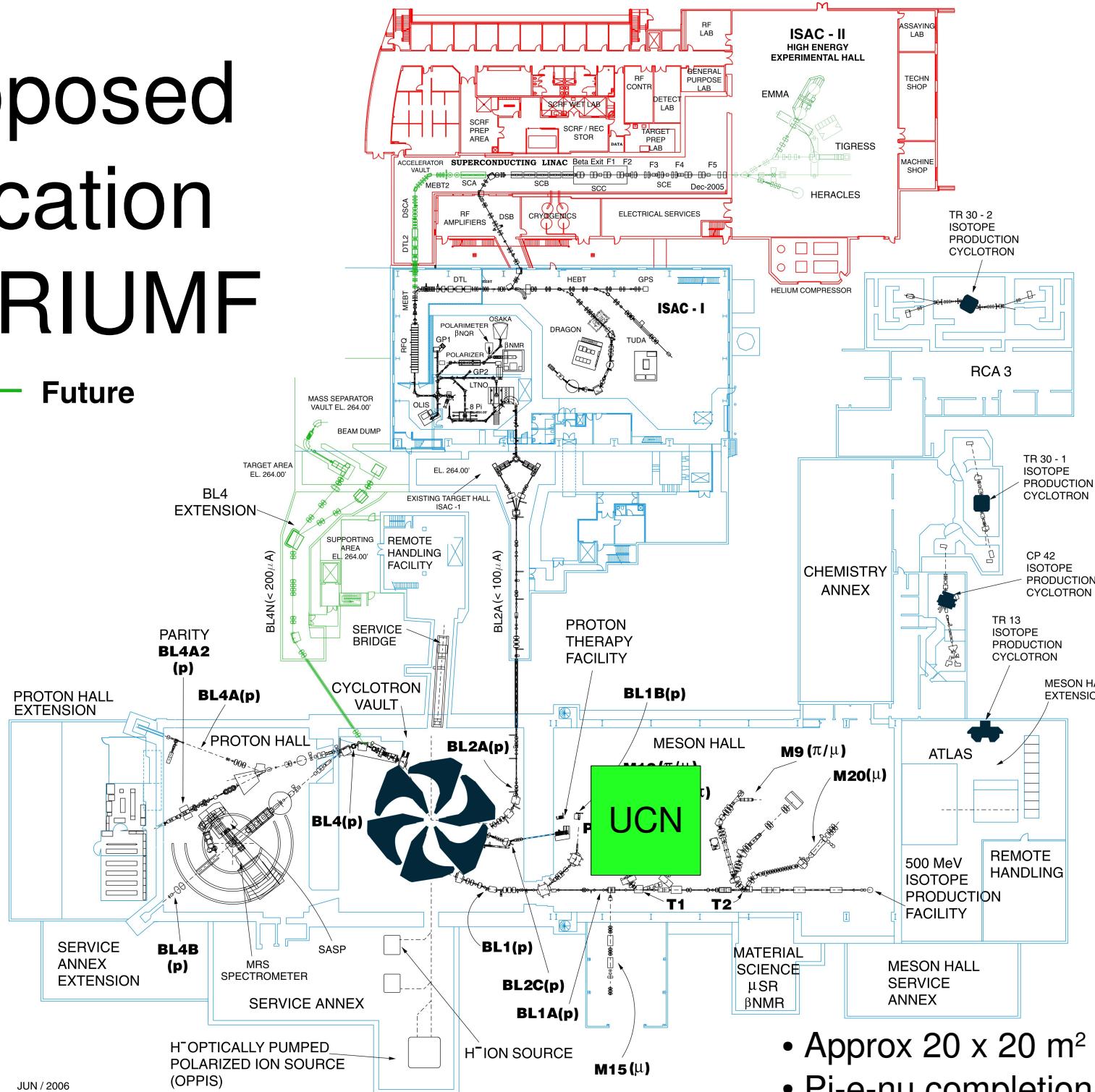
Collaborators: J.D. Bowman, J. Birchall, L. Buchmann, L. Clarke, C. Davis, B.W. Filippone, M. Gericke, R. Golub, K. Hatanaka, M. Hayden, T.M. Ito, S. Jeong, I. Kato, S. Komamiya, E. Korobkina, E. Korkmaz, L. Lee, K. Matsuta, A. Micherdzinska, W.D. Ramsay, S.A. Page, B. Plaster, I. Tanihata, W.T.H. van Oers, Y. Watanabe, S. Yamashita, T. Yoshioka

(KEK, Winnipeg, Manitoba, ORNL, TRIUMF, NCSU, Caltech,  
RCNP, SFU, LANL, Tokyo, UNBC, Osaka, Kentucky)

We propose to construct the world's highest density source of ultracold neutrons and use it to conduct fundamental and applied physics research using neutrons.

# Proposed Location at TRIUMF

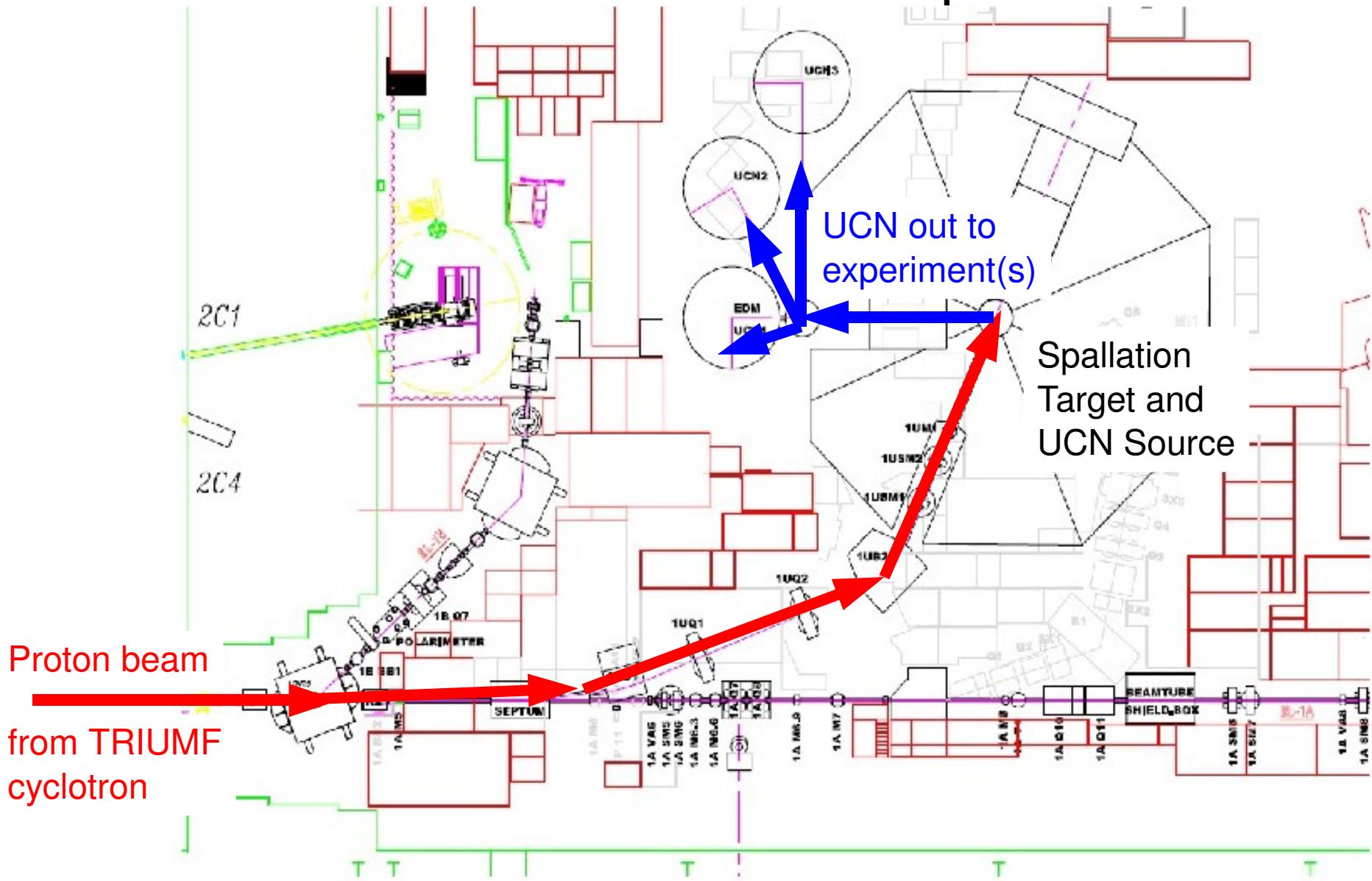
Future



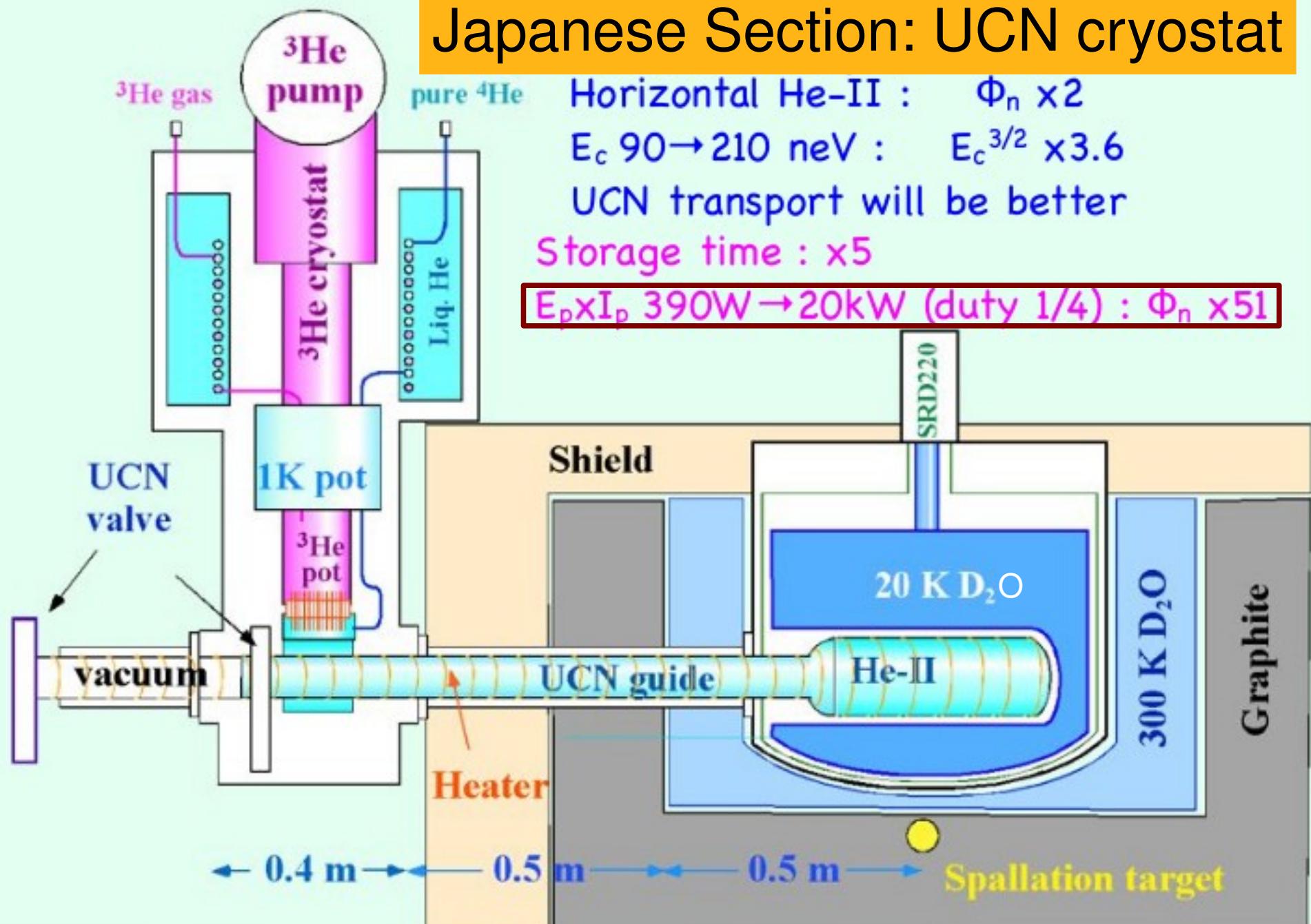
- Approx 20 x 20 m<sup>2</sup> box
- Pi-e-nu completion 2011

# i-SUN Implementation at TRIUMF

## Meson Hall concept



# Japanese Section: UCN cryostat



# World's UCN projects

	source type	$E_c$ neV	$P_{UCN}$ /cm <sup>3</sup> /s	$\tau_s$ s	$\epsilon_{ext}$	$P_{UCN}$ /cm <sup>3</sup> source/exp.
TRIUMF	spallation He-II	210	$0.4 \times 10^4$ (10L)	150	~1	$3 \times 10^5$ (20L) $1-5 \times 10^4$
ILL	n beam He-II	250	10	150	~1	**/1000
SNS	n beam He-II	134	0.3 (7L)	500	1	**/150
LANL *	spallation SD2	250	$4.4 \times 10^4$ (240cm <sup>3</sup> )	1.6	$1.3 \times 10^3$ / $4.4 \times 10^4$	**/120
PSI	spallation SD2	250	$2.9 \times 10^5$ (27L*)	6	0.1	$2000$ (2m <sup>3</sup> ) /1000
NCSU	reactor SD2	335	$2.7 \times 10^4$ (1L)	**	**	1300/**
Munich	reactor SD2	250	**	**	**	$1 \times 10^4$ /**

# Physics Experiments for i-SUN



- neutron lifetime
  - gravity levels
  - surface science
  - n-EDM
  - nnbar?
  - Free n target?
- near term
- longer term

# Budget Summary

Item	Cost	Funding Source
UCN cryostat system	\$4M	Japanese collaborators
Beamline, instrumentation	\$2M	TRIUMF
Kickers, shielding, spallation target	\$4.225M	CFI NIF
Moderator design	\$0.675M	Manitoba + Acsion Industries
<b>Total</b>	<b>\$10.9M</b>	

- UCN cryostat system includes:
  - Existing UCN source (\$2M)
  - Modifications to source for TRIUMF (\$2M)
    - Horizontal extraction, improved guide technology, etc.

# i-SUN timeline

- 2007-8: UCN source supported by TRIUMF committees, included in plan for TRIUMF
- 2008: CFI NIF proposal submitted
  - In-kind contributions from Japan, TRIUMF
- 2009-12:
  - develop UCN source in Japan, EDM experiments
  - preparations and design in Canada
  - develop collaborations and proposals for experiments
- 2012-13: Install, commission at TRIUMF
- 2012-15: First experiments