

### Key comparison CCRI(III)-K11

**MEASURAND : Fluence per monitor M1-count at 1 m distance from the target in vacuum in  $\text{cm}^{-2}$**

$x_i$  : result of measurement carried out by laboratory  $i$

$u_i$  : combined standard uncertainty of  $x_i$

All measurements were performed from September 2011 to October 2012.

#### NEUTRON ENERGY : 27.4 keV

Lab $i$	$x_i$ / ( $\text{cm}^{-2}$ )	$u_i$ / ( $\text{cm}^{-2}$ )	$u_i / x_i$ / %
NPL	1.770	0.059	3.33
VNIM	1.700	0.054	3.18
IRMM	-	-	-
PTB	1.795	0.043	2.40
NIST	1.656	0.093	5.62
NMIJ	1.821	0.078	4.28
LNE-IRSN	1.716	0.060	3.50

#### NEUTRON ENERGY : 565 keV

Lab $i$	$x_i$ / ( $\text{cm}^{-2}$ )	$u_i$ / ( $\text{cm}^{-2}$ )	$u_i / x_i$ / %
NPL	2.194	0.050	2.28
VNIM	2.059	0.049	2.38
IRMM	-	-	-
PTB	2.107	0.055	2.61
NIST	2.294	0.093	4.05
NMIJ	2.172	0.048	2.21
LNE-IRSN	2.131	0.054	2.53

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All measurements were performed from September 2011 to October 2012.

#### NEUTRON ENERGY : 2.5 MeV

Lab $i$	$x_i$ / (cm <sup>-2</sup> )	$u_i$ / (cm <sup>-2</sup> )	$u_i / x_i$ / %
NPL	2.250	0.050	2.22
VNIIM	2.145	0.052	2.42
IRMM	2.316	0.049	2.10
PTB	2.235	0.038	1.70
NIST	2.238	0.077	3.44
NMIJ	2.301	0.073	3.17
LNE-IRSN	2.275	0.052	2.29

#### NEUTRON ENERGY : 17 MeV

Lab $i$	$x_i$ / (cm <sup>-2</sup> )	$u_i$ / (cm <sup>-2</sup> )	$u_i / x_i$ / %
NPL	2.371	0.070	2.95
VNIIM	-	-	-
IRMM	-	-	-
PTB	2.480	0.063	2.54
NIST	2.521	0.108	4.28
NMIJ	2.572	0.113	4.39
LNE-IRSN	2.347	0.064	2.73

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MEASURAND : Fluence per monitor M1-count at 1 m distance from the target in vacuum in  $\text{cm}^{-2}$

NEUTRON ENERGIES : 27.4 keV, 565 keV, 2.5 MeV, and 17 MeV

For each neutron energy, the key comparison reference value,  $x_R$ , and its standard uncertainty,  $u_R$ , are obtained from the weighted mean of the participants' results.

Neutron energy	$x_R$ / ( $\text{cm}^{-2}$ )	$u_R$ / ( $\text{cm}^{-2}$ )	$u_R / x_R$ / %
27.4 keV	1.752	0.022	1.26
565 keV	2.143	0.028	1.31
2.5 MeV	2.248	0.021	0.93
17 MeV	2.429	0.042	1.72

The degree of equivalence of laboratory  $i$  with respect to the key comparison reference value is given by a pair of terms, both expressed in  $\text{cm}^{-2}$ :  $D_i = (x_i - x_R)$  and its expanded uncertainty  $U_i$  ( $k = 2$ ),  $U_i = 2(u_i^2 - u_R^2)^{1/2}$ .

The degree of equivalence between two laboratories  $i$  and  $j$  is given by a pair of terms both expressed in  $\text{cm}^{-2}$ :

$D_{ij} = (D_i - D_j) = (x_i - x_j)$  and its expanded uncertainty  $U_{ij}$  ( $k = 2$ ),  $U_{ij} = 2(u_i^2 + u_j^2)^{1/2}$ .

The pair-wise degrees of equivalence are not explicitly given here, but can be found in Table A.3.1 to A.3.4 on page 26 and 27 of the Final Report.

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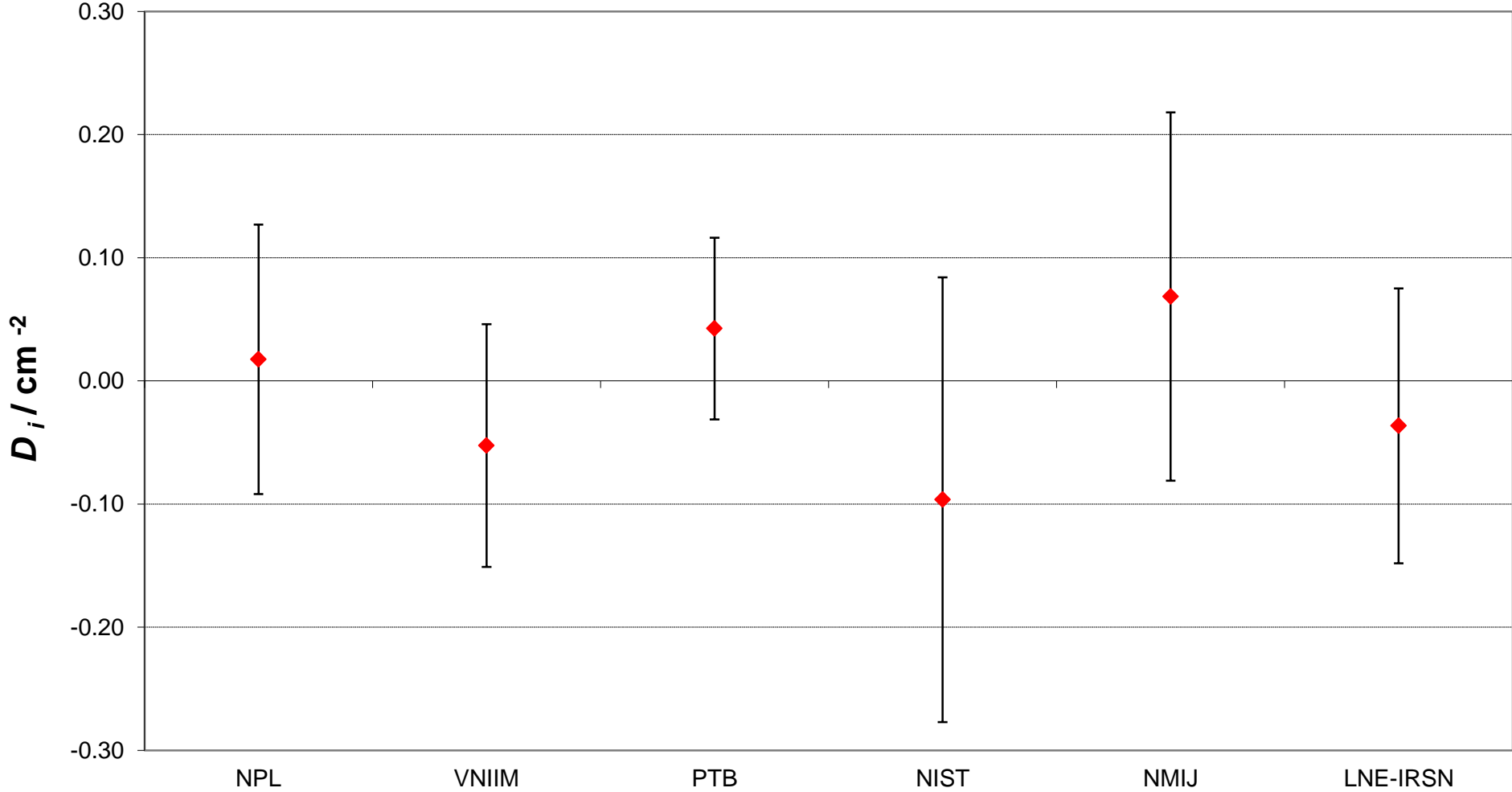
MEASURAND : Fluence per monitor M1-count at 1 m distance from the target in vacuum in  $\text{cm}^{-2}$

NEUTRON ENERGIES : 27.4 keV, 565 keV, 2.5 MeV, and 17 MeV

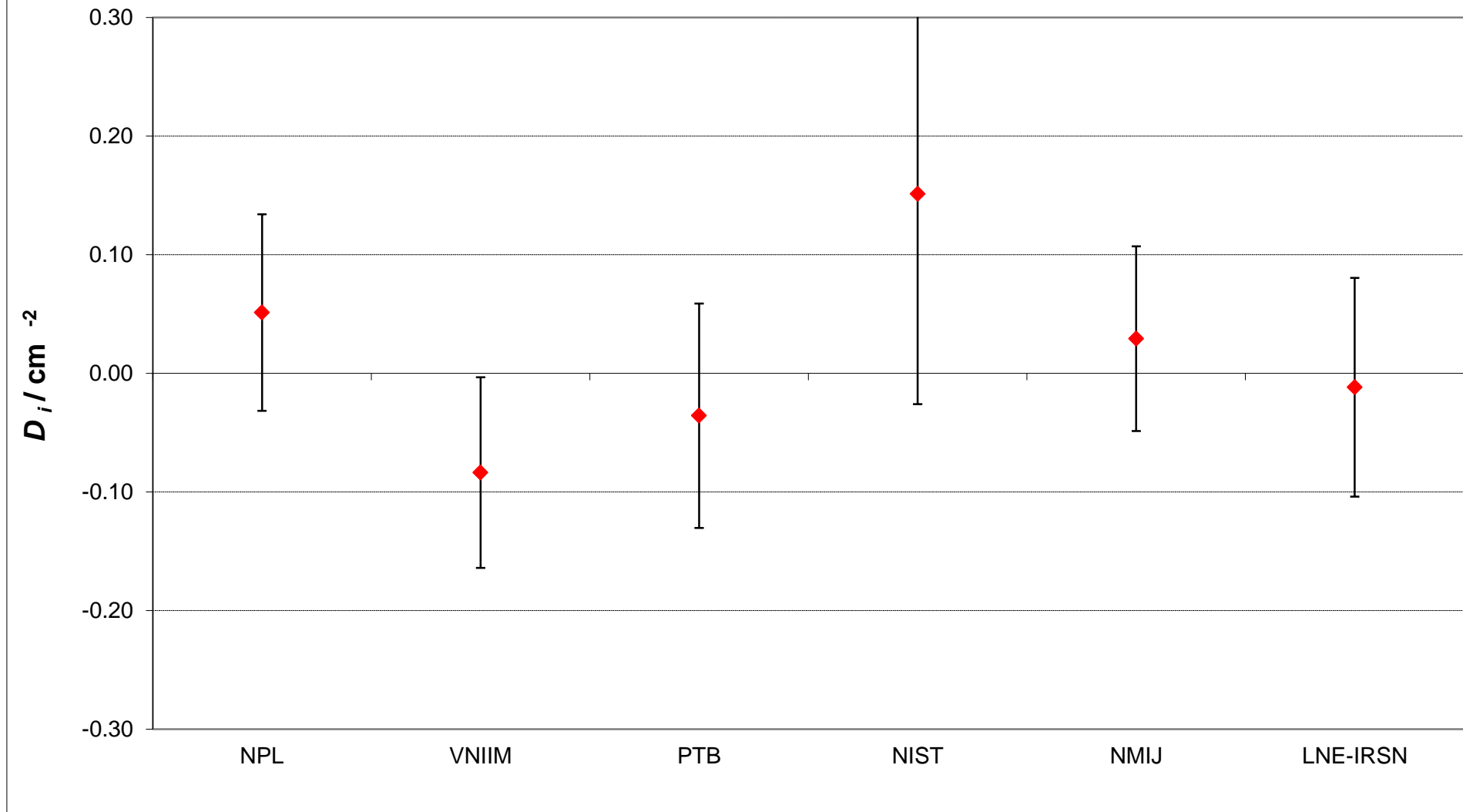
Degrees of equivalence:  $D_i$  and  $U_i$  ( $k = 2$ ) expressed in  $\text{cm}^{-2}$

Neutron energy $\Rightarrow$	27.4 keV		565 keV		2.5 MeV		17 MeV	
	$D_i$ $/ (\text{cm}^{-2})$	$U_i$ $/ (\text{cm}^{-2})$	$D_i$ $/ (\text{cm}^{-2})$	$U_i$ $/ (\text{cm}^{-2})$	$D_i$ $/ (\text{cm}^{-2})$	$U_i$ $/ (\text{cm}^{-2})$	$D_i$ $/ (\text{cm}^{-2})$	$U_i$ $/ (\text{cm}^{-2})$
Lab $i$ $\downarrow$								
NPL	0.018	0.109	0.051	0.083	0.002	0.091	-0.058	0.112
VNIIM	-0.052	0.099	-0.084	0.080	-0.103	0.095	-	-
IRMM	-	-	-	-	0.068	0.088	-	-
PTB	0.043	0.074	-0.036	0.095	-0.013	0.063	0.051	0.094
NIST	-0.096	0.181	0.151	0.177	-0.010	0.148	0.092	0.199
NMIJ	0.069	0.150	0.029	0.078	0.053	0.140	0.143	0.210
LNE-IRSN	-0.036	0.112	-0.012	0.092	0.027	0.095	-0.082	0.097

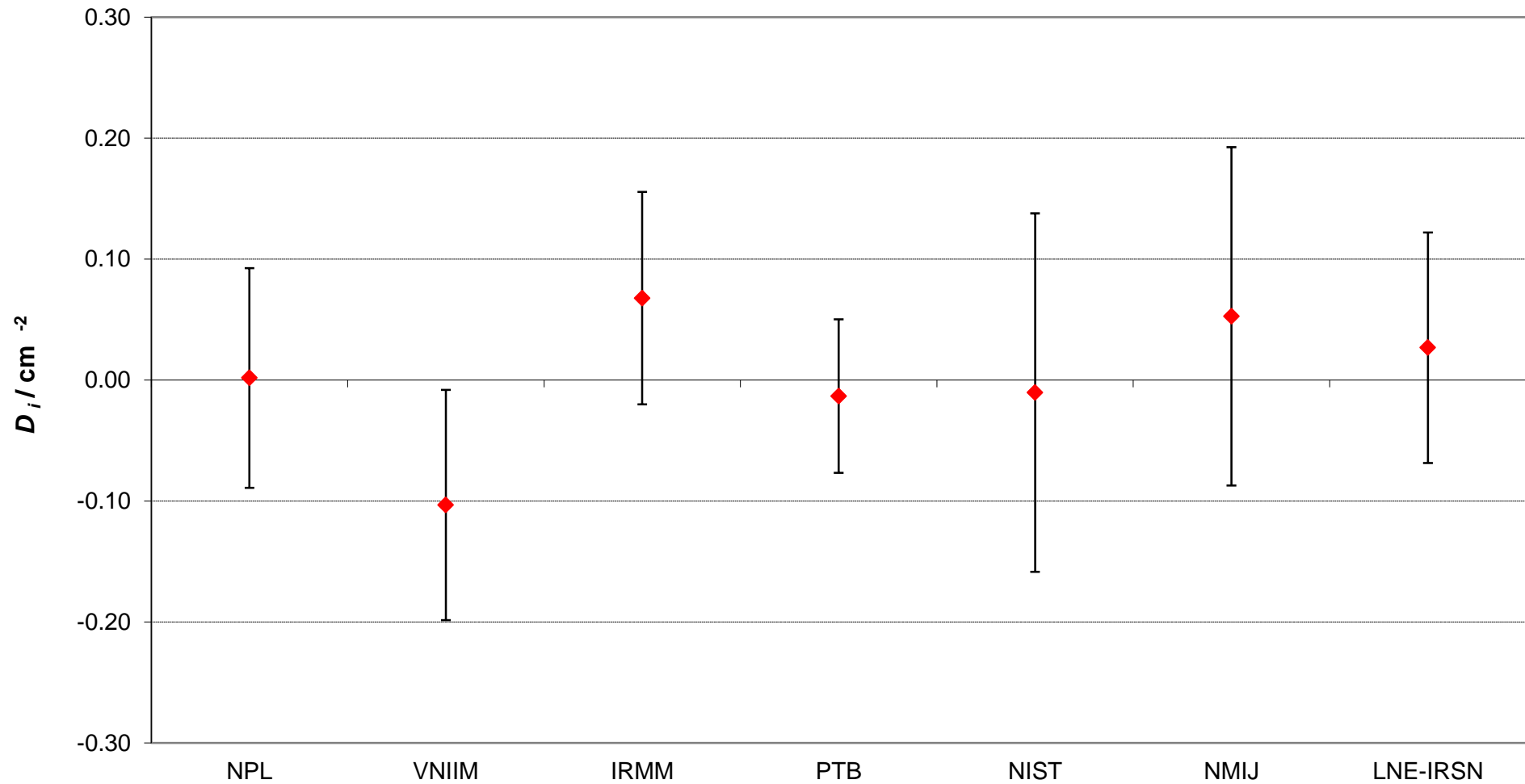
**CCRI(III)-K11 Fluence measurement at 27.4 keV**  
Degrees of equivalence,  $D_i$  and expanded uncertainty  $U_i$  ( $k = 2$ )



**CCRI(III)-K11 Fluence measurement at 565 keV**  
Degrees of equivalence,  $D_i$ , and expanded uncertainty  $U_i$  ( $k = 2$ )



**CCRI(III)-K11 Fluence measurement at 2.5 MeV**  
**Degrees of equivalence,  $D_i$  and expanded uncertainty  $U_i$  ( $k = 2$ )**



**CCRI(III)-K11 Fluence measurement at 17 MeV**  
Degrees of equivalence,  $D_i$  and expanded uncertainty  $U_i (k = 2)$

