ꯑꯦꯗꯤꯇꯣꯔꯤꯌꯦꯜ IMPHAL, WEDNESDAY, SEPTEMBER 07, 2022 ꯌꯨꯝꯁꯀꯩꯁ, ꯂꯥꯡꯕꯟꯒꯤ 12 ꯅꯤ ꯄꯥꯟꯕ, ꯃꯥꯂꯤꯌꯥ ꯀꯨꯝꯁꯤꯡ 3420 obT\ꯂꯩ ꯃꯀꯩꯋ꯭ꯀ 2 HUEIYEN LANPAO

ꯄꯥꯎꯆꯦ ꯑꯁꯤꯗ ꯐꯣꯡꯖꯔꯤꯕ ꯋꯥꯔꯦꯡꯁꯤꯡ ꯑꯁꯤꯒꯤ ꯋꯥꯈꯜ, ꯃꯤꯠꯌꯦꯡ ꯑꯏꯕ ꯃꯁꯥ ꯃꯁꯥꯒꯤꯅꯤ꯫ ꯄꯥꯎꯆꯦ ꯑꯁꯤꯒ ꯄꯥꯎꯆꯦ ꯑꯁꯤꯒꯤ ꯋꯥꯈꯜꯂꯣꯟ ꯑꯃꯁꯨꯡ ꯃꯤꯠꯌꯦꯡꯒ ꯊꯣꯏꯗꯣꯛꯅ ꯃꯔꯤ ꯂꯩꯅꯗꯦ꯫

ꯍꯨꯏꯌꯦꯟ ꯂꯥꯟꯄꯥꯎ
ꯌꯨꯝꯁꯀꯩꯁ, ꯁꯦꯞꯇꯦꯝꯕꯔ 07, 2022, ꯏꯝꯐꯥꯜ
14 ꯁꯨꯕ ꯆꯍꯤ, 141 ꯁꯨꯕ ꯃꯁꯤꯡ
ꯍꯨꯏꯌꯦꯟ ꯂꯥꯟꯄꯥꯎ ꯂꯤꯇꯔꯦꯔꯤ ꯀ꯭ꯋꯤꯖ-49
1) ‘‘ꯂꯥꯏꯙꯤ ꯖꯒꯣꯏꯒꯤ ꯋꯥꯔꯤ” ꯍꯥꯏꯕ ꯂꯥꯏꯔꯤꯛ ꯑꯁꯤ ꯀꯅꯥꯅ ꯑꯣꯔꯤꯖꯤꯅꯦꯜ ꯀꯔꯤ
ꯂꯣꯜꯗ ꯏꯕꯗꯒꯤ ꯀꯅꯥꯅ ꯃꯅꯤꯄꯨꯔꯤꯗ ꯍꯟꯗꯣꯛꯄꯅꯣ?
2) “ꯃꯦꯅꯀꯥꯒꯤ ꯃꯆꯥꯅꯨꯄꯤ” ꯍꯥꯏꯕ ꯂꯥꯏꯔꯤꯛ ꯑꯁꯤꯒꯤ ꯑꯏꯕ ꯀꯅꯥꯅꯣ ꯑꯃꯁꯨꯡ
ꯀꯔꯝꯕ ꯃꯈꯜꯒꯤ ꯂꯥꯏꯔꯤꯛꯅꯣ?
3) “ꯅꯤꯇꯤ ꯂꯤꯂꯥ ꯗꯤꯕꯥꯔꯥꯁ” ꯍꯥꯏꯕ ꯂꯥꯏꯔꯤꯛ ꯑꯁꯤꯒꯤ ꯑꯏꯕ ꯀꯅꯥꯅꯣ?

4) “ꯄꯨꯟꯁꯤ ꯑꯃꯁꯨꯡ ꯇꯤꯡꯈꯪ” ꯍꯥꯏꯕ ꯂꯥꯏꯔꯤꯛ ꯑꯁꯤꯒꯤ ꯑꯏꯕ ꯀꯅꯥꯅꯣ ꯑꯃꯗꯤ
ꯀꯔꯝꯕ ꯃꯈꯜꯒꯤ ꯂꯥꯏꯔꯤꯛꯅꯣ?

5) “ꯑꯁꯪꯕ ꯆꯤꯡꯃꯥꯏꯁꯤꯡ/ꯑꯃꯨꯕ ꯐꯤꯖꯣꯜ ꯍꯣꯡꯗꯣꯛꯈ꯭ꯔꯕꯗ/ꯀꯥꯏꯔꯛꯂꯦ
ꯔꯤꯇꯨꯒꯤ ꯈꯣꯡꯆꯠ/ꯏꯆꯦꯜ ꯂꯦꯞꯈ꯭ꯔꯦ ꯇꯨꯔꯦꯜꯁꯤꯡ/ꯆꯦꯜꯂꯛꯂꯦ ꯂꯩꯀ꯭ꯔꯛꯀꯤ
ꯏꯆꯦꯜ” ꯁꯩꯔꯦꯡ ꯑꯁꯤ ꯀꯅꯥꯅ ꯏꯕ ꯂꯥꯏꯔꯤꯛꯇ ꯌꯥꯎꯕ ꯀꯔꯤ ꯁꯩꯔꯦꯡꯅꯣ?

ꯃꯊꯛꯇ ꯄꯤꯔꯤꯕꯤ ꯋꯥꯍꯪꯁꯤꯡ ꯑꯁꯤꯒꯤ ꯄꯥꯎꯈꯨꯝ ꯁꯦꯞꯇꯦꯝꯕꯔ 15, ꯁꯒꯣꯜꯁꯦꯟ
ꯅꯨꯃꯤꯠꯀꯤ ꯑꯌꯨꯡ ꯄꯨꯡ 11 ꯐꯥꯎꯕꯒꯤ ꯃꯅꯨꯡꯗ ꯄꯥꯎꯆꯦ ꯑꯁꯤꯒꯤ ꯑꯣꯐꯤꯁꯇ ꯅꯠꯇ꯭ꯔꯒ
I-meL hueiyenliteraryquiz@gmail.com sid meL AoIn
ꯊꯥꯕꯤꯔꯛꯄ ꯌꯥꯒꯅꯤ꯫ ꯄꯥꯎꯈꯨꯝ ꯄꯤꯕꯤꯔꯛꯄ/ꯊꯥꯕꯤꯔꯛꯄ ꯃꯇꯝꯗ ꯃꯤꯡ, ꯂꯩꯐꯝ,
ꯃꯍꯩꯒꯤ ꯊꯥꯛ ꯑꯃꯁꯨꯡ ꯀꯟꯇꯦꯛꯠ ꯅꯝꯕꯔ ꯃꯌꯦꯛ ꯁꯦꯡꯅ ꯏꯕꯤꯔꯛꯎ꯫
ꯋꯥꯍꯪ ꯈꯨꯗꯤꯡꯃꯛꯀꯤ ꯄꯥꯎꯈꯨꯝ ꯆꯨꯝꯅ ꯅꯠꯇ꯭ꯔꯒ ꯃꯁꯤꯡ ꯌꯥꯝꯅ ꯆꯨꯝꯅ ꯄꯤꯕꯤꯔꯛꯄ
ꯃꯤꯑꯣꯏꯁꯤꯡ ꯑꯗꯨꯗꯒꯤ ꯗ꯭ꯔꯣ ꯑꯣꯠꯆꯔꯒ ꯂꯥꯏꯕꯛ ꯐꯕ ꯃꯤꯁꯛ ꯑꯃ ꯈꯟꯖꯒꯅꯤ꯫
ꯂꯣꯏꯅꯅ ꯈꯜꯂꯕ ꯃꯤꯁꯛ ꯑꯗꯨꯗ ꯃꯅꯥ ꯄꯤꯖꯒꯅꯤ꯫

ꯗꯥꯏꯃꯟꯗꯒꯤ ꯅꯣꯡ ꯆꯨꯔꯤꯕ ꯒ꯭ꯔꯍ ꯑꯅꯤ: ꯌꯨꯔꯥꯅꯁ ꯑꯃꯁꯨꯡ ꯅꯦꯞꯇ꯭ꯌꯨꯟ (ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯕꯣꯠꯇꯜꯗꯒꯤ ꯗꯥꯏꯃꯟꯗ ꯁꯨꯡꯕꯁꯨ ꯌꯥꯔꯒꯅꯤ)

‘ꯄꯨꯟꯁꯤꯒꯤ ꯂꯥꯡꯐꯝꯗ’ -(1)
ꯁꯥꯏꯟꯁꯀꯤ ꯈꯣꯡꯆꯠ
ꯀꯨꯟꯖꯣ ꯅꯥꯎꯔꯦꯝ
ꯅꯊꯤꯡꯗꯒꯤ ꯁꯝꯊꯤꯡꯅ ꯐꯩ

HOnadugi wani
ꯀꯔꯤꯃꯇ ꯅꯠꯇ꯭ꯔꯒ ꯁꯨꯡꯂꯩ ꯂꯩꯇꯕꯕꯨꯗꯤ ꯈꯔꯗꯪ ꯑꯣꯏꯔꯕꯁꯨ ꯂꯩꯕꯅ
ꯐꯩ꯫ ꯋꯥꯍꯩꯁꯤꯃꯛ ꯏꯪꯂꯤꯁ ꯂꯣꯟꯗꯁꯨ ꯂꯩ꯫ ꯁꯝꯊꯤꯡ ꯏꯁ ꯕꯦꯠꯇꯔ
ꯗꯦꯟ ꯅꯊꯤꯡ ꯍꯥꯏ꯫ ꯋꯥꯐꯝꯁꯤ ꯌꯥꯝꯅ ꯆꯨꯝꯃꯤ꯫ ꯌꯨꯅꯤꯚꯔꯁꯦꯜ
ꯇ꯭ꯔꯨꯊꯅꯤ ꯍꯥꯏꯔꯕ ꯐꯥꯎꯕ ꯌꯥꯏ꯫ ꯍꯥꯏꯁꯨ ꯍꯥꯏꯅꯩ, ꯑꯗꯨꯕꯨ ꯋꯥꯐꯝꯁꯤꯃꯛ
ꯄꯣꯂꯤꯇꯤꯛꯁꯇ ꯄꯨꯁꯤꯜꯂꯛꯂꯒꯗꯤ ꯃꯔꯨ ꯑꯣꯏꯅ ꯂꯦꯖꯤꯁꯂꯦꯇꯤꯚ
ꯑꯦꯁꯦꯝꯕ꯭ꯂꯤꯁꯤꯡꯗ ꯐꯤꯛꯁ ꯇꯧꯔꯛꯂꯒꯗꯤ ꯂꯤꯖꯤꯁꯂꯦꯇꯤꯚ ꯑꯃꯒꯤ
ꯃꯇꯤꯛ ꯃꯊꯧꯅ ꯏꯟꯗꯤꯄꯦꯟꯗꯦꯟꯠ ꯑꯦꯝ ꯑꯦꯜ ꯑꯦ ꯑꯣꯏꯔꯒ ꯑꯣꯏꯔꯦ,
ꯄꯥꯔꯇꯤ ꯑꯃꯗ ꯕꯤꯂꯣꯡ ꯇꯧꯔꯒꯗꯤ ꯃꯍꯥꯛꯀꯤ ꯏꯟꯇꯤꯒ꯭ꯔꯤꯇꯤꯗ
ꯀ꯭ꯋꯦꯁꯟ ꯃꯌꯥꯝ ꯊꯣꯔꯛꯏ꯫ ꯐꯤꯚꯝꯁꯤ ꯁ꯭ꯇꯦꯠ ꯑꯃꯁꯨꯡ ꯌꯨꯅꯤꯌꯟ
ꯇꯦꯔꯤꯇꯣꯔꯤꯁꯤꯡꯒꯤ ꯂꯦꯖꯤꯁꯂꯦꯇꯤꯚ ꯑꯦꯁꯦꯝꯕ꯭ꯂꯤꯁꯤꯡꯒꯤ ꯋꯥꯐꯝ
ꯉꯥꯛ ꯅꯠꯇꯅ ꯂꯩꯕꯥꯛꯁꯤꯒꯤ ꯄꯥꯔꯂꯤꯌꯥꯃꯦꯟꯠꯀꯤ ꯃꯦꯝꯕꯔꯁꯤꯡꯗꯁꯨ
ꯍꯦꯛ-ꯍꯦꯛ ꯊꯣꯛꯏ꯫ ꯑꯗꯨꯒ ꯑꯁꯤꯒꯨꯝꯕ ꯊꯧꯗꯣꯛꯁꯤ
ꯄꯥꯔꯂꯤꯌꯥꯃꯦꯟꯇꯔꯤ ꯐꯣꯔꯝ ꯑꯣꯐ ꯒꯚꯔꯟꯃꯦꯟꯠꯀꯤ ꯂꯩꯉꯥꯛꯂꯣꯟ
(ꯁꯤꯁꯇꯝ) ꯆꯠꯅꯔꯤꯕ ꯂꯩꯕꯥꯛꯁꯤꯗꯗꯤ ꯑꯅꯧꯕ ꯊꯧꯗꯣꯛꯁꯨ ꯑꯣꯏꯗꯦ꯫
ꯌꯥꯝꯅ ꯇꯣꯏꯅ ꯊꯣꯛꯏ꯫ ꯑꯆꯧ-ꯑꯆꯧꯕ ꯁ꯭ꯇꯦꯠꯁꯤꯡꯗ ꯇꯧꯅꯔꯛꯄꯗꯒꯤ
ꯑꯄꯤꯛꯄ ꯁ꯭ꯇꯦꯠ ꯃꯆꯥꯁꯤꯡꯗꯁꯨ ꯃꯇꯧ ꯇꯝꯅꯔꯛꯏ꯫ ꯃꯁꯤꯅ
ꯂꯩꯕꯥꯛꯁꯤꯒꯤ ꯑꯄꯨꯟꯕꯒꯤ ꯑꯣꯏꯕ ꯋꯥꯅꯤ꯫ ꯃꯅꯤꯄꯨꯔꯒꯤ ꯀꯟꯇꯦꯛꯁꯇ
ꯌꯦꯡꯂꯨꯔꯕꯗꯤ ꯀꯨꯝꯖꯥ 1972 ꯒꯤ ꯖꯅ꯭ꯌꯨꯋꯥꯔꯤ 21 ꯗ ꯃꯄꯨꯡ ꯐꯥꯕ ꯁ꯭ꯇꯦꯠ
ꯑꯃ ꯑꯣꯏꯔꯛꯈꯤꯕꯗꯒꯤ ꯑꯦꯁꯦꯝꯕ꯭ꯂꯤ ꯀꯟꯁꯇꯤꯇ꯭ꯌꯨꯑꯦꯟꯁꯤ 60
ꯂꯩꯍꯜꯂꯒ ꯄꯥꯡꯊꯣꯔꯛꯂꯤꯕ ꯑꯦꯁꯦꯝꯕ꯭ꯂꯤ ꯃꯤꯈꯜꯁꯤꯡꯒꯤ ꯃꯇꯨꯡꯗꯗꯤ
ꯄꯥꯋꯔ ꯄꯥꯏꯗꯨꯅ ꯂꯩꯕꯥꯛ ꯂꯩꯉꯥꯛꯄꯗ ꯌꯥꯎꯕꯅ ꯍꯦꯟꯅ ꯐꯩ ꯈꯟꯅꯔꯛꯄ
ꯋꯥꯈꯜꯒꯤ ꯇꯨꯡꯏꯟꯕ ꯊꯕꯛ ꯀꯌꯥ ꯆꯠꯊꯅꯔꯛꯄ ꯇꯣꯏꯅ ꯊꯦꯡꯅꯩ꯫
ꯍꯥꯏꯕꯗꯤ ꯈꯔ ꯍꯦꯟꯅ ꯆꯥꯎꯕ, ꯂꯦꯖꯤꯁꯂꯦꯇꯔ ꯃꯁꯤꯡ ꯌꯥꯝꯕ ꯄꯥꯔꯇꯤꯗ
ꯂꯩꯉꯥꯛ ꯈꯨꯠꯄꯥꯏꯔꯅꯤꯕ ꯄꯥꯔꯇꯤꯁꯤꯡꯗ ꯈꯨꯔꯨꯞ ꯊꯥꯗꯨꯅ ꯍꯨꯞꯆꯤꯟꯅꯕ,
ꯆꯣꯡꯁꯤꯟꯅꯕꯒꯤ ꯊꯧꯗꯣꯛꯁꯤ ꯇꯣꯏꯅ ꯊꯣꯛꯏ꯫

ꯂꯤꯟꯗꯅ ꯍꯉꯣꯏ ꯂꯥꯛꯄ, ꯎꯝꯃꯒ ꯆꯦꯟꯗꯨꯅ ꯄꯨꯕ ꯅꯠꯇ꯭ꯔꯒ
ꯄꯨꯝꯌꯣꯠ ꯌꯣꯟꯁꯤꯟꯈꯤꯕꯒꯤ ꯊꯧꯑꯣꯡꯁꯤ ꯃꯍꯧꯁꯥꯒꯤ ꯑꯣꯏꯕ ꯃꯆꯠꯅꯤ꯫
ꯀꯅꯥꯃꯠꯇꯅ ꯊꯤꯡꯂꯨꯕ ꯉꯝꯂꯣꯏ, ꯉꯝꯁꯨ ꯉꯝꯗꯦ ꯑꯗꯨꯅ ꯑꯗꯨꯃꯛ
ꯆꯠꯊꯗꯨꯅ ꯂꯩ꯫ ꯑꯗꯨꯒ ꯂꯩꯕꯥꯛꯁꯤꯒꯤ ꯄꯣꯂꯤꯇꯤꯀꯦꯜ ꯁꯤꯁꯇꯝꯗꯁꯨ
ꯄꯥꯔꯇꯤ ꯑꯃꯗꯒꯤ ꯑꯃꯗ ꯆꯣꯡꯁꯤꯟꯕꯒꯤ ꯊꯕꯛꯁꯤꯡ ꯑꯗꯨꯝ ꯊꯣꯛꯏ꯫
ꯂꯩꯕꯥꯛꯁꯤꯒꯤ ꯀꯟꯁꯇꯤꯇ꯭ꯌꯨꯁꯟꯗ ‘ꯇꯦꯟꯊ ꯁꯦꯗ꯭ꯌꯨꯜ’ ꯍꯥꯏꯕ ’ꯃ ꯂꯩ꯫
ꯁꯦꯗ꯭ꯌꯨꯜꯒꯤ ꯄ꯭ꯔꯣꯚꯤꯖꯟꯁꯤꯡꯅ ꯍꯉꯣꯏꯗꯧꯅ ꯆꯣꯡꯊꯣꯛ-ꯆꯣꯡꯁꯤꯟ
ꯄꯪꯇꯧꯗ ꯇꯧꯗꯅꯕꯒꯤ ꯄꯥꯗꯝ ꯂꯥꯛꯅꯕ ꯀꯥꯡꯂꯣꯟꯁꯤꯡ ꯁꯦꯝꯃꯤ꯫

ꯆꯠꯅꯗꯨꯅꯁꯨ ꯂꯥꯛꯏ꯫ ꯑꯗꯨꯕꯨ ꯇꯦꯟꯊ ꯁꯦꯗ꯭ꯌꯨꯜꯒꯤ ꯋꯥꯡꯂꯕ ꯄꯜ
ꯂꯥꯟꯗꯨꯅ ꯆꯣꯡꯈꯤꯕ ꯌꯥꯕꯒꯤ ꯑꯌꯥꯕꯁꯨ ꯌꯥꯎꯕꯅ ꯃꯗꯨꯅ ꯄꯥꯝꯕꯩ ꯑꯣꯏꯅ
ꯁꯤꯖꯤꯟꯅꯔꯒ ꯑꯃꯅ ꯑꯃꯗ ꯆꯣꯡꯊꯣꯛ-ꯆꯣꯡꯁꯤꯟꯒꯤ ꯊꯧꯗꯣꯛꯁꯤ
ꯑꯗꯨꯃꯛ ꯊꯣꯛꯏ꯫ ꯃꯁꯤꯒꯤ ꯃꯔꯝꯁꯤꯡꯒꯤ ꯃꯅꯨꯡꯗ ꯈ꯭ꯋꯥꯏꯗꯒꯤ ꯃꯔꯨ
ꯑꯣꯏꯔꯤꯕꯗꯤ ‘ꯁꯝꯊꯤꯡ ꯏꯁ ꯕꯦꯠꯇꯔ ꯗꯦꯟ ꯅꯊꯤꯡ’ ꯍꯥꯏꯕꯁꯤꯁꯨ
ꯑꯃꯅꯤ꯫ ꯃꯁꯤꯃꯛ ꯂꯦꯖꯤꯁꯂꯦꯇꯔ ꯐꯥꯎꯕ ꯑꯣꯏꯔꯛꯂꯕ ꯃꯇꯨꯡꯒꯤ
ꯋꯥꯗꯤ ꯊꯝꯕꯨ ꯊꯝꯈ꯭ꯔꯣ, ꯑꯣꯏꯅꯅꯕ ꯍꯣꯠꯅꯔꯛꯇꯨꯅ ꯃꯤꯈꯜ ꯊꯦꯡꯅꯅꯕ
ꯃꯐꯤ ꯁꯦꯝꯂꯛꯄꯗ ꯁ꯭ꯇꯦꯠ ꯑꯃꯁꯨꯡ ꯁꯦꯟꯇꯔꯗ ꯂꯩꯉꯥꯛꯄ ꯌꯥꯕ
ꯄꯥꯔꯇꯤꯗ ꯀꯣꯛꯀꯥꯏ ꯂꯨꯀꯥꯏꯅꯕ ꯊꯣꯛꯄꯃꯈꯩ ꯊꯣꯝꯖꯤꯟꯅꯩ꯫ ꯃꯤꯌꯥꯝꯅ
ꯄꯥꯝꯕ/ꯄꯥꯝꯗꯕ ꯑꯃꯁꯨꯡ ꯌꯥꯅꯤꯡꯕ/ꯌꯥꯅꯤꯡꯗꯕ ꯅꯥꯆꯨꯡꯗꯦ꯫ ꯃꯤꯌꯥꯝꯒꯤ
ꯑꯄꯥꯝꯕꯗ ꯆꯠꯇꯦ꯫ ꯃꯈꯣꯏ-ꯃꯈꯣꯏꯅ ꯃꯤꯌꯥꯝꯕꯨ ꯍꯨꯝꯗꯨꯅ ꯄꯨꯔꯒ
ꯆꯠꯂꯤ꯫ ꯃꯤꯌꯥꯝꯁꯨ ꯅꯊꯤꯡꯗꯒꯤ ꯁꯝꯊꯤꯡꯅ ꯐꯩ ꯍꯥꯏꯕꯁꯤꯗ ꯂꯣꯏꯅ
ꯄꯨꯟꯁꯤꯟꯅꯔꯛꯄꯅꯤꯅ ꯂꯦꯖꯤꯁꯂꯦꯇꯔꯁꯤꯡꯒ ꯑꯃꯠꯇ ꯍꯦꯛꯇ
ꯑꯣꯏ꯫ ꯃꯁꯤꯃꯛ ꯍꯧꯖꯤꯛ ꯂꯩꯕꯥꯛꯁꯤꯗ ꯆꯠꯅꯕꯗꯒꯤ ꯃꯁꯤꯒꯤ ꯁꯔꯨꯛ
ꯑꯃ ꯑꯣꯏꯔꯤꯕ ꯃꯅꯤꯄꯨꯔꯗꯁꯨ ꯆꯞ-ꯆꯥꯅ ꯊꯣꯛꯏ꯫ ꯑꯗꯨꯕꯨ ꯁꯦꯟꯇꯔꯗ
ꯑꯣꯏꯅꯤꯡꯕ ꯄꯣꯂꯤꯇꯤꯀꯦꯜ ꯄꯥꯔꯇꯤꯒꯤ ꯂꯩꯅꯤꯡꯕ ꯂꯩꯉꯥꯛꯂꯩꯖꯁꯨꯅ꯫
ꯁ꯭ꯇꯦꯠꯀꯤꯗꯤ ꯃꯤꯌꯥꯝꯒꯤꯗꯃꯛ ꯍꯦꯟꯅ ꯈꯟꯅꯕ ꯄꯥꯔꯇꯤꯅ ꯂꯩꯉꯥꯛ
ꯄꯥꯏꯅꯕ ꯍꯣꯠꯅꯒꯅꯤ ꯍꯥꯏꯕꯒꯤ ꯋꯥꯐꯝ ꯂꯩꯇꯦ꯫ ꯁꯨꯡꯂꯩ ꯂꯩꯇꯕꯕꯨꯗꯤ
ꯑꯣꯏꯔꯝꯂꯣꯏ ꯍꯥꯏꯕꯕꯨ ꯏꯂꯦꯛꯁꯟ ꯄꯥꯡꯊꯣꯛꯂꯝꯗꯥꯏꯗ ꯃꯊꯤ
ꯐꯣꯡꯂꯛꯄ ꯄꯥꯔꯇꯤꯅ ꯀꯣꯛꯊꯣꯡ ꯑꯃꯅꯤ ꯍꯥꯏꯕꯒꯤ ꯋꯥꯅꯤ꯫ ꯄꯥꯔꯇꯤ
ꯃꯥꯟꯅꯗ꯭ꯔꯕꯁꯨ ꯁ꯭ꯇꯦꯠꯀꯤ ꯆꯥꯛꯊꯨꯡ ꯄꯤꯗꯕ ꯌꯥꯔꯣꯏ, ꯆꯥꯎꯈꯠ-
ꯊꯧꯔꯥꯡ ꯇꯧꯔꯛꯇꯕ ꯌꯥꯔꯣꯏ ꯍꯥꯏꯗꯨꯅ ꯃꯨꯛꯂꯒ ꯅꯝꯗꯨꯅ ꯂꯧꯕ ꯉꯝꯕꯒꯤ
ꯊꯧꯅꯥꯗꯨꯗꯤ ꯍꯣꯇ꯭ꯔꯣꯡ ꯍꯣꯏ, ‘ꯖꯤ’ ‘ꯖꯤ’ ꯍꯥꯏꯗꯨꯅ ꯃꯊꯨꯟ ꯆꯨꯞꯄꯒ ꯂꯩꯅꯕ
ꯍꯣꯠꯅꯕꯗꯅ ꯍꯦꯟꯅ ꯊꯋꯥꯏ ꯌꯥꯎꯖꯩ ꯍꯥꯏꯕꯒꯤ ꯋꯥꯅꯤ꯫

ꯊꯤꯖꯤꯟꯕꯒꯤ ꯊꯕꯛꯁꯤꯅꯕꯨ ꯂꯦꯞꯇ꯭ꯔꯕꯗꯤ ꯊꯥꯖꯔꯝꯗꯕ ꯀꯌꯥ
ꯊꯥꯖꯔꯛꯏ, ꯑꯣꯏꯔꯣꯏ ꯈꯜꯂꯝꯕ ꯀꯌꯥ ꯑꯣꯏꯔꯛꯏ꯫ ꯌꯨꯔꯦꯅꯁ
(ꯃꯩꯇꯩ/ꯃꯤꯇꯩꯒꯤ ꯊꯥꯖꯅꯕꯤꯒꯤ ꯃꯇꯨꯡꯏꯟꯅ ꯇꯥꯎꯔꯣꯏꯅꯥꯏꯒꯤ
ꯃꯀꯣꯛꯅꯤ ꯍꯥꯏꯅ ꯊꯥꯖꯔꯤꯕ, ꯁꯥꯀꯣꯛ ꯍꯥꯏꯅ ꯈꯪꯅꯔꯤꯕ) ꯑꯃꯁꯨꯡ
ꯅꯦꯞꯇ꯭ꯌꯨꯟ(ꯇꯥꯎꯔꯣꯏꯅꯥꯏꯒꯤ ꯃꯃꯩ, ꯁꯥꯃꯩ ꯍꯥꯏꯅ
ꯈꯪꯅꯔꯤꯕ) ꯒ꯭ꯔꯍꯁꯤꯡ ꯑꯁꯤꯗ ꯗꯥꯏꯃꯟꯗ
ꯅꯣꯡ ꯆꯨꯏ ꯍꯥꯏꯅ ꯑꯦꯁꯇ꯭ꯔꯣꯅꯣꯃꯔ ꯈꯔꯅ
ꯊꯥꯖꯕ ꯊꯝꯅꯔꯛꯈꯤ꯫ ꯁꯣꯂꯔ ꯁꯤꯁꯇꯝꯒꯤ
ꯋꯥꯡꯃꯗ ꯂꯩꯔꯤꯕ ꯒ꯭ꯔꯍꯁꯤꯡ ꯍꯥꯏꯕꯗꯤ
ꯑꯦꯛꯄ꯭ꯂꯣꯄ꯭ꯂꯥꯅꯦꯠꯁꯤꯡꯗꯁꯨ ꯑꯁꯤꯒꯨꯝꯕ
ꯊꯧꯑꯣꯡꯁꯤ ꯊꯣꯛꯂꯝꯒꯅꯤ ꯍꯥꯏꯅ ꯊꯥꯖꯗꯨꯅ ꯂꯥꯛꯈꯤ꯫
ꯁꯥꯀꯣꯛ ꯑꯁꯤ ꯃꯥꯂꯦꯝꯒꯤ ꯑꯦꯁ꯭ꯇꯣꯅꯣꯃꯤꯀꯦꯜ
ꯌꯨꯅꯤꯠ (ꯑꯦ ꯌꯨ) 20 ꯃꯨꯛ ꯂꯥꯞꯄꯤ, ꯍꯥꯏꯕꯗꯤ
ꯃꯥꯂꯦꯝꯒ ꯅꯨꯃꯤꯠꯀ ꯂꯥꯞꯅꯔꯤꯕꯁꯤꯒꯤ ꯁꯔꯨꯛ 20
ꯃꯨꯛ ꯂꯥꯞꯄꯤ; ꯑꯗꯨꯒ ꯁꯥꯃꯩ ꯑꯁꯤꯅ ꯃꯥꯂꯦꯝꯗꯒꯤ ꯑꯦ
ꯌꯨ 30 ꯃꯨꯛ ꯂꯥꯞꯄꯤ꯫ ꯒ꯭ꯔꯍ ꯑꯅꯤꯁꯤꯃꯛꯁꯤꯒꯤ
ꯂꯩꯃꯥꯏꯁꯤ ꯃꯔꯨ ꯑꯣꯏꯅ ꯏꯁꯤꯡ, ꯑꯦꯃꯣꯅꯤꯌꯥ,
ꯑꯣꯛꯁꯤꯖꯦꯟ ꯑꯃꯁꯨꯡ ꯃꯤꯊꯦꯟꯒꯤ ꯎꯟꯁꯤꯡꯅ
ꯁꯦꯝꯃꯤ꯫ ꯒ꯭ꯔꯍ ꯑꯅꯤꯁꯤꯗ ꯗꯥꯏꯃꯟꯗꯀꯤ ꯅꯣꯡ
ꯆꯨꯏ ꯍꯥꯏꯕꯁꯤ ꯍꯥꯏꯄꯣꯊꯦꯁꯤꯁ ꯑꯃ ꯑꯣꯏꯅ
ꯂꯧꯅꯔꯛꯈꯤ꯫ ꯑꯁꯨꯝꯅ ꯊꯥꯖꯔꯛꯈꯤꯕ ꯑꯁꯤꯕꯨ
ꯍꯦꯟꯅ ꯐꯤꯚꯝ ꯆꯦꯠꯁꯤꯟꯍꯜꯂꯗꯨꯅ SLAC ꯁꯥꯏꯟꯇꯤꯁꯠꯁꯤꯡꯅ ꯑꯣꯛꯁꯤꯖꯦꯟꯅ ꯗꯥꯏꯃꯟꯗ ꯁꯨꯡꯕꯒꯤ ꯊꯧꯑꯣꯡꯗ ꯃꯇꯦꯡ ꯄꯥꯡꯏ ꯍꯥꯏꯕꯁꯤ ꯆꯥꯡꯌꯦꯡ ꯇꯧꯗꯨꯅ ꯎꯠꯄ ꯉꯝꯈ꯭ꯔꯦ ꯍꯥꯏꯔꯤ꯫ ꯑꯁꯤꯒꯨꯝꯕ ꯆꯥꯡꯌꯦꯡ ꯑꯁꯤꯅ ꯃꯥꯂꯦꯝꯗ ꯂꯩꯔꯤꯕ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯕꯣꯠꯇꯜꯁꯤꯡꯗꯒꯤ ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡ ꯁꯨꯡꯕ ꯉꯝꯍꯜꯂꯒꯅꯤ ꯍꯥꯏꯕꯒꯤ ꯊꯥꯖꯕꯁꯨ ꯂꯩꯔꯦ ꯍꯥꯏꯔꯤ꯫
ꯊꯤꯖꯤꯟ-ꯂꯨꯞ ꯑꯁꯤꯒꯤ ꯑꯍꯥꯟꯕ ꯆꯥꯡꯌꯦꯡꯗ (ꯅꯦꯆꯔ ꯑꯦꯁꯇ꯭ꯔꯣꯅꯣꯃꯤ, ꯑꯣꯒꯁꯠ 21, 2017 ꯇ ꯐꯣꯡꯗꯣꯛꯈꯤꯕ), ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯒꯤ ꯃꯔꯝꯗ ꯊꯤꯖꯤꯟꯕꯒꯤ ꯊꯕꯛꯁꯤꯡ ꯄꯥꯏꯈꯠꯄ ꯍꯧꯔꯛꯈꯤ꯫ ꯑꯦꯠꯃꯣꯁꯐ꯭ꯌꯦꯔꯅ ꯑꯁꯨꯛꯀꯤ ꯃꯇꯤꯛ ꯏꯪꯂꯕꯁꯨ, ꯒ꯭ꯔꯍ ꯑꯅꯤꯁꯤꯒꯤ ꯂꯩꯅꯨꯡꯁꯤ ꯀꯥ ꯍꯦꯟꯅ ꯁꯥꯏ ꯑꯃꯁꯨꯡ ꯀꯥ ꯍꯦꯟꯅ ꯄ꯭ꯔꯦꯁꯔ ꯋꯥꯡꯏ꯫ ꯑꯁꯤꯒꯨꯝꯕ ꯐꯤꯚꯝꯁꯤꯒ ꯃꯥꯟꯅꯕ ꯈꯨꯠꯁꯦꯝꯒꯤ ꯐꯤꯚꯝ ꯑꯃ ꯂꯨꯞ ꯑꯁꯤꯅ ꯂꯦꯕꯇ ꯁꯦꯝꯒꯠꯂꯝꯃꯤ꯫ ꯐꯤꯚꯝꯁꯤꯗ SLAC ꯅꯦꯁꯅꯜ ꯑꯦꯛꯁꯦꯂꯔꯦꯇꯔ ꯂꯦꯕꯣꯔꯦꯇꯔꯤꯒꯤ ꯑꯦꯛꯁ-ꯔꯦ ꯐ꯭ꯔꯤ- ꯏꯂꯦꯛꯇ꯭ꯔꯣꯟ ꯂꯦꯖꯔꯅ ꯃꯦꯠꯇꯔ ꯏꯟ ꯑꯦꯛꯁ꯭ꯔꯤꯝ ꯀꯟꯗꯤꯁꯟ (MEC) ꯏꯟꯁꯇ꯭ꯔꯨꯃꯦꯟꯠꯇ ꯃꯄꯥꯡꯒꯜ ꯀꯜꯂꯕ ꯑꯣꯞꯇꯤꯀꯦꯜ ꯂꯦꯖꯔ ꯑꯃ ꯄꯤꯁꯤꯜꯂꯒ, ꯁꯦꯟꯇꯤꯒ꯭ꯔꯦꯗ ꯗꯤꯒ꯭ꯔꯤ 6,000 ꯐꯥꯎꯕ ꯈꯨꯗꯛꯇ ꯁꯥꯍꯜꯂꯤ ꯑꯗꯨꯒ ꯄ꯭ꯂꯥꯁꯇꯤꯛꯇ ꯁꯣꯛ ꯋꯦꯚꯁꯤꯡ ꯊꯣꯛꯍꯟꯗꯨꯅ ꯄ꯭ꯂꯥꯁꯇꯤꯛꯀꯤ ꯃꯦꯇꯔꯤꯑꯦꯜꯗꯨꯕꯨ ꯃꯥꯂꯦꯝꯒꯤ ꯑꯦꯠꯃꯣꯁꯐꯦꯔꯤꯛ ꯄ꯭ꯔꯦꯁꯔꯒꯤ ꯁꯔꯨꯛ ꯃꯤꯂꯤꯌꯟ ꯑꯃꯃꯨꯛ ꯀꯟꯅ ꯀꯝꯄ꯭ꯔꯦꯁ ꯇꯧꯈꯤ꯫ ꯆꯥꯡꯌꯦꯡ ꯑꯗꯨꯗ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯑꯗꯨꯗ ꯌꯥꯎꯔꯝꯕ ꯀꯥꯔꯕꯣꯟ ꯑꯦꯇꯝ ꯈꯨꯗꯤꯡꯃꯛꯅ ꯅꯥꯅꯣꯃꯤꯇꯔ ꯈꯔꯒꯤ ꯆꯥꯡꯗ ꯄꯥꯛꯄ ꯑꯄꯤꯛꯄ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯁ꯭ꯇ꯭ꯔꯛꯆꯔꯁꯤꯡ ꯁꯦꯝꯂꯛꯄꯗꯨ ꯊꯦꯡꯅꯈꯤ꯫ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯗ ꯐꯪꯂꯤꯕ ꯗꯥꯏꯃꯟꯗꯁꯤꯡ ꯑꯗꯨꯗꯤ ꯌꯥꯝ ꯆꯥꯎꯔꯝꯒꯅꯤ ꯑꯃꯁꯨꯡ ꯀꯦꯔꯠ ꯃꯤꯂꯤꯌꯟ ꯀꯌꯥꯃꯨꯛ ꯂꯨꯝꯂꯝꯕ ꯌꯥꯏ ꯍꯥꯏꯅ ꯂꯧꯔꯝꯃꯤ꯫ ꯗꯥꯏꯃꯟꯗꯁꯤꯡ ꯑꯁꯤꯅ ꯆꯍꯤ ꯂꯤꯁꯤꯡ ꯀꯌꯥꯒꯤ ꯃꯅꯨꯡꯗ ꯒ꯭ꯔꯍꯁꯤꯡ ꯑꯁꯤꯒꯤ ꯎꯟꯒꯤ ꯃꯔꯣꯜꯁꯤꯡ ꯐꯥꯎꯗꯨꯅ
ꯂꯩꯅꯨꯡꯗ ꯇꯞꯅ ꯇꯞꯅ ꯆꯪꯈ꯭ꯔꯒ ꯃꯄꯪ ꯑꯣꯏꯅ ꯂꯩꯔꯤꯕ, ꯃꯌꯥꯏ ꯆꯕꯨꯛꯀꯤ ꯑꯀꯣꯏꯕꯗ
ꯑꯊꯥꯕ ꯃꯔꯣꯜ ꯑꯃ ꯁꯦꯝꯂꯝꯕ ꯌꯥꯕꯒꯤ ꯑꯣꯏꯊꯣꯛꯄꯁꯨ ꯂꯩ ꯍꯥꯏꯔꯤ꯫
ꯗꯥꯏꯃꯟꯗ ꯍꯥꯏꯕꯁꯤ ꯀꯥꯔꯕꯣꯟ ꯑꯦꯇꯝꯁꯤꯡꯅ ꯁꯦꯝꯕ ꯊ꯭ꯔꯤ-ꯗꯥꯏꯃꯦꯟꯁꯟꯒꯤ
ꯐꯖꯔꯕ ꯁ꯭ꯇ꯭ꯔꯛꯆꯔ ꯂꯩꯕ ꯏꯂꯤꯃꯦꯟꯠ ꯑꯃꯅꯤ꯫ ꯃꯤꯊꯦꯟ, ꯄ꯭ꯂꯥꯁꯇꯤꯛꯅꯆꯤꯡꯕꯁꯤꯡ
ꯀꯥꯔꯕꯣꯟꯒꯤ ꯀꯝꯄꯥꯎꯟꯗꯁꯤꯡꯅꯤ; ꯑꯗꯨꯅ ꯃꯈꯣꯏꯁꯤ ꯌꯥꯝꯅ ꯅꯛꯅꯕ ꯃꯔꯤ ꯂꯩ꯫
ꯑꯩꯈꯣꯏꯒꯤ ꯃꯥꯂꯦꯝ ꯑꯁꯤꯒꯤ ꯂꯩꯅꯨꯡꯗ ꯃꯍꯧꯁꯥꯒꯤ ꯊꯧꯑꯣꯡꯅ ꯀꯥ ꯍꯦꯟꯅ ꯁꯥꯔꯕ ꯑꯃꯁꯨꯡ ꯀꯥ
ꯍꯦꯟꯅ ꯋꯥꯡꯂꯕ ꯄ꯭ꯔꯦꯁꯔꯗ ꯗꯥꯏꯃꯟꯗꯁꯤꯡ ꯁꯦꯝꯂꯛꯈꯤ ꯍꯥꯏꯅ ꯊꯥꯖꯅꯩ꯫ ꯃꯇꯧ ꯑꯁꯨꯝꯅ
ꯃꯥꯟꯅꯕ ꯅꯠꯇ꯭ꯔꯒ ꯇꯣꯉꯥꯟꯕ ꯊꯧꯑꯣꯡ ꯑꯃꯗ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯗꯁꯨ ꯗꯥꯏꯃꯟꯗꯁꯤꯡ
ꯁꯦꯝꯂꯝꯕ ꯌꯥꯏ ꯍꯥꯏꯅ ꯊꯥꯖꯅꯩ꯫ ꯒ꯭ꯔꯥꯍ ꯑꯅꯤꯁꯤꯗ ꯊꯣꯛꯂꯝꯕ ꯌꯥꯕ ꯊꯧꯑꯣꯡꯗꯨꯕꯨ ꯁꯤꯃꯨꯂꯦꯁꯟ
ꯁꯤꯖꯤꯟꯅꯗꯨꯅ ꯂꯦꯕꯣꯔꯦꯇꯔꯤꯗ ꯁꯦꯝꯒꯠꯂꯒ ꯆꯥꯡꯌꯦꯡꯁꯤꯡꯁꯤ ꯄꯥꯡꯊꯣꯛꯈꯤꯕꯅꯤ꯫
ꯑꯍꯥꯟꯕ ꯆꯥꯡꯌꯦꯡꯁꯤꯒꯤ ꯃꯅꯨꯡꯗ ꯄꯥꯡꯊꯣꯛꯈꯤꯕ ꯑꯅꯤꯁꯨꯕ ꯆꯥꯡꯌꯦꯡꯗ SLAC
ꯒ ꯈꯨꯠꯁꯝꯅꯔꯒ ꯊꯦꯂꯃꯍꯣꯂꯇꯉ-Zentrum ꯙꯔꯦꯁꯗꯦꯅ-Rossendorf
(HZDR) ꯑꯃꯁꯨꯡ ꯖꯔꯃꯅꯤꯒꯤ ꯌꯨꯅꯤꯚꯔꯁꯤꯇꯤ ꯑꯣꯐ ꯔꯣꯁꯇꯣꯛ, ꯂꯣꯏꯅ-ꯂꯣꯏꯅꯅ
ꯐ꯭ꯔꯥꯟꯁꯀꯤ Ecole PolytechniquepuLlg ꯁꯦꯝꯕ, ꯊꯤꯖꯤꯟ ꯂꯨꯞ ꯑꯁꯤꯅ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯕꯨ ꯁꯦꯝꯂꯤꯕ ꯀꯦꯃꯤꯀꯦꯜꯒꯤ ꯃꯆꯜꯁꯤꯡꯗꯨꯒ ꯌꯥꯝꯅ ꯃꯥꯟꯅꯕ ꯃꯑꯣꯡ ꯑꯃ ꯁꯦꯝꯒꯠꯂꯒ ꯌꯥꯕꯒꯤ ꯑꯣꯏꯊꯣꯛꯄꯗꯨ ꯊꯦꯡꯅꯔꯛꯈꯤ꯫ ꯑꯁꯨꯝꯅ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯅꯣꯡ ꯀꯔꯝꯅ ꯑꯣꯏꯔꯛꯂꯤꯕꯅꯣ ꯍꯥꯏꯕꯒꯤ ꯍꯦꯟꯅ ꯃꯌꯦꯛ ꯁꯦꯡꯂꯕ ꯁꯛꯇꯝ ꯑꯃ ꯁꯥꯒꯠꯄ ꯉꯝꯈꯤ꯫ ꯊꯤꯖꯤꯟ-ꯆꯦꯔꯣꯜꯗꯨ ꯁꯥꯏꯟꯁ ꯑꯦꯗꯚꯥꯟꯆ (ꯁꯦꯞꯇꯦꯝꯕꯔ 2, 2022) ꯗ ꯐꯣꯡꯗꯣꯔꯛꯈꯤꯕꯅꯤ꯫

ꯑꯍꯥꯟꯕ ꯆꯥꯡꯌꯦꯡꯗ, ꯊꯤꯖꯤꯟ ꯂꯨꯄ ꯑꯁꯤꯅ ꯍꯥꯏꯗ꯭ꯔꯣꯖꯦꯟ ꯑꯃꯁꯨꯡ ꯀꯥꯔꯕꯟꯒꯤ ꯌꯥꯟꯁꯤꯟꯅꯕ ꯑꯃꯗꯒꯤ ꯁꯦꯝꯕ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯃꯦꯇꯔꯤꯑꯦꯜ ꯑꯃꯗ ꯅꯩꯅꯈꯤ꯫ ꯃꯈꯣꯏꯁꯤ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯕꯨ ꯁꯦꯝꯂꯤꯕ
ꯀꯦꯃꯤꯀꯦꯜꯒꯤ ꯃꯆꯜꯁꯤꯡꯅꯤ꯫ ꯎꯟꯁꯤꯡꯒꯤ ꯆꯥꯎꯔꯕ ꯒ꯭ꯔꯍ
ꯑꯅꯤꯁꯤꯗ ꯑꯣꯛꯁꯤꯖꯦꯟꯒꯤ ꯆꯥꯡꯁꯨ ꯌꯥꯝꯅ ꯌꯥꯎꯏ꯫ ꯑꯅꯤꯁꯨꯕꯒꯤ
ꯆꯥꯡꯌꯦꯡ ꯑꯗꯨꯗꯅ ꯊꯤꯖꯤꯟ ꯂꯨꯞ ꯑꯁꯤꯅ ꯆꯤꯟꯖꯥꯛ ꯌꯣꯝꯅꯕ
ꯄ꯭ꯂꯥꯁꯇꯤꯛ, ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯕꯣꯠꯇꯜ ꯑꯃꯁꯨꯡ ꯀꯟꯇꯦꯏꯅꯔꯁꯤꯡ
ꯁꯥꯕꯗ ꯁꯤꯖꯤꯟꯅꯔꯤꯕ PET ꯄ꯭ꯂꯥꯁꯇꯤꯛ
ꯁꯤꯖꯤꯟꯅꯈꯤ꯫ HZDR ꯗ ꯐꯤꯖꯤꯁꯤꯁꯠ
ꯑꯃꯁꯨꯡ ꯌꯨꯅꯤꯚꯔꯁꯤꯇꯤ ꯑꯣꯐ ꯔꯣꯁꯇꯣꯛꯇ
ꯄ꯭ꯔꯣꯐꯦꯁꯔ ꯑꯣꯏꯔꯤꯕ, ꯙꯣꯃꯤꯅꯤꯀ
Kraus ꯅ ꯐꯣꯡꯗꯣꯛꯄꯒꯤ ꯃꯇꯨꯡꯏꯟꯅ
ꯎꯟꯈꯛꯇꯅ ꯌꯣꯝꯂꯕ ꯒ꯭ꯔꯍ ꯑꯅꯤꯁꯤꯗ
ꯊꯣꯛꯂꯤꯕ ꯀꯦꯃꯤꯀꯦꯜꯒꯤ ꯊꯧꯑꯣꯡꯁꯤꯡꯁꯨ
ꯁꯤꯃꯨꯂꯦꯠ ꯇꯧꯅꯕꯒꯤꯗꯃꯛ PET ꯗ ꯀꯥꯔꯕꯣꯟ,
ꯍꯥꯏꯗ꯭ꯔꯣꯖꯦꯟ ꯑꯃꯁꯨꯡ ꯑꯣꯛꯁꯤꯖꯦꯟꯒꯤ ꯆꯥꯡꯁꯤ
ꯍꯦꯟꯅ ꯆꯨꯅꯕ ꯑꯣꯏ ꯍꯥꯏꯔꯤ꯫
PET ꯗ ꯁꯣꯛ ꯋꯦꯚꯁꯤꯡ
ꯊꯣꯛꯍꯟꯅꯕꯒꯤꯗꯃꯛ, ꯊꯤꯖꯤꯟ ꯂꯨꯞ ꯑꯁꯤ
SLAC ki Linac Coherent Light
Source (LCLS) ꯇ ꯂꯩꯔꯤꯕ ꯃꯦꯠꯇꯔ
ꯏꯟ ꯑꯦꯛꯁꯇ꯭ꯔꯤꯝ ꯀꯟꯗꯤꯁꯟꯁꯇ ꯍꯥꯏ-
ꯄꯥꯋꯔ ꯑꯣꯞꯇꯤꯀꯦꯜ ꯂꯦꯖꯔ ꯑꯃ ꯁꯤꯖꯤꯟꯅꯈꯤ꯫
ꯃꯁꯤꯗꯒꯤꯗꯤ ꯂꯨꯞ ꯑꯁꯤꯅ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯑꯗꯨꯗ
ꯀꯔꯤ ꯑꯍꯣꯡꯕ ꯊꯣꯔꯛꯄꯒꯦ ꯍꯥꯏꯕꯗꯨ ꯌꯦꯡꯅꯕꯒꯤꯗꯃꯛ LCLS ꯇꯒꯤ ꯑꯦꯛꯁ-ꯔꯦ ꯄꯜꯁꯁꯤꯡꯕꯨ ꯁꯤꯖꯤꯟꯅꯈꯤ꯫ ꯑꯦꯛꯁ-ꯔꯦ ꯗꯤꯐ꯭ꯔꯥꯛꯁꯟ ꯍꯥꯏꯔꯤꯕ ꯇꯦꯛꯅꯤꯛ ꯑꯁꯤ ꯁꯤꯖꯤꯟꯅꯗꯨꯅ ꯂꯨꯞ ꯑꯁꯤꯅ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯑꯗꯨꯒꯤ ꯑꯦꯇꯝꯁꯤꯡꯅ ꯑꯄꯤꯛꯄ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯔꯤꯖꯟꯁꯤꯡꯗ ꯑꯅꯧꯕ ꯁ꯭ꯇ꯭ꯔꯛꯆꯔ ꯑꯃ ꯁꯦꯝꯂꯛꯄꯗꯨ ꯌꯦꯡꯂꯝꯃꯤ꯫ ꯃꯇꯝ ꯑꯁꯤꯃꯛꯇꯗ, ꯑꯍꯥꯟꯕ ꯆꯥꯡꯌꯦꯡꯗꯗꯤ ꯁꯤꯖꯤꯟꯅꯈꯤꯗꯕ, ꯁ꯭ꯃꯣꯜ-ꯑꯦꯡꯒꯜ ꯁ꯭ꯀꯦꯇꯔꯤꯡ ꯍꯥꯏꯅ ꯈꯪꯅꯕ ꯑꯇꯣꯞꯄ ꯃꯦꯊꯗ ꯑꯃꯁꯨ ꯁꯤꯖꯤꯟꯅꯈꯤ; ꯃꯁꯤꯅ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯔꯤꯖꯟꯁꯤꯡꯗꯨꯅ ꯀꯌꯥ ꯊꯨꯅ ꯑꯃꯗꯤ ꯀꯌꯥ ꯌꯥꯝꯅ ꯆꯥꯎꯈꯠꯂꯛꯄꯒꯦ ꯍꯥꯏꯕꯗꯨ ꯑꯣꯜꯂꯝꯃꯤ꯫ ꯇꯦꯛꯅꯤꯛ ꯁꯤꯒꯤ ꯃꯇꯦꯡꯅ ꯃꯈꯣꯏꯅ ꯗꯥꯏꯃꯟꯗ ꯔꯤꯖꯟꯁꯤꯡꯗꯨ ꯅꯥꯅꯣꯃꯤꯇꯔ ꯈꯔꯒꯤ ꯆꯥꯡꯗ ꯐꯥꯎꯕ ꯆꯥꯎꯈꯠꯂꯛꯄ ꯉꯝꯃꯤ ꯍꯥꯏꯕꯗꯨ ꯈꯪꯕ ꯉꯝꯂꯝꯃꯤ꯫ ꯄ꯭ꯂꯥꯁꯇꯤꯛ ꯃꯦꯇꯔꯤꯑꯦꯜ ꯑꯗꯨꯗ ꯑꯣꯛꯁꯤꯖꯦꯟ ꯌꯥꯎꯕ ꯃꯇꯝꯗ ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡꯗꯨ ꯍꯦꯟꯅ ꯅꯦꯝꯕ ꯄ꯭ꯔꯦꯁꯔ ꯑꯃꯁꯨꯡ ꯇꯦꯝꯄꯦꯔꯦꯆꯔꯗ ꯁꯦꯝꯂꯛꯄ ꯉꯝꯃꯤ ꯍꯥꯏꯕꯗꯨꯁꯨ ꯈꯪꯕ ꯉꯝꯂꯝꯃꯤ꯫ ꯑꯣꯛꯁꯤꯖꯦꯟꯅ ꯀꯥꯔꯕꯣꯟ ꯑꯃꯁꯨꯡ ꯍꯥꯏꯗ꯭ꯔꯣꯖꯦꯟꯕꯨ ꯈꯥꯏꯗꯣꯛꯅꯕꯒꯤ ꯊꯕꯛꯇ ꯊꯨꯖꯤꯟꯍꯟꯕ ꯉꯝꯃꯤ, ꯑꯗꯨꯅ ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡ ꯁꯦꯝꯕꯗ ꯃꯇꯦꯡ ꯄꯥꯡꯏ ꯍꯥꯏꯅ Kraus ꯅ ꯐꯣꯡꯗꯣꯛꯂꯤ꯫
ꯃꯈꯣꯏꯒꯤ ꯆꯥꯡꯌꯦꯡ ꯑꯁꯤꯗꯒꯤ ꯗꯥꯏꯃꯟꯗꯁꯤꯡꯒ ꯂꯣꯏꯅꯅ ꯁꯨꯄꯔꯑꯥꯏꯑꯣꯅꯤꯛ ꯋꯥꯇꯔꯁꯨ ꯁꯦꯝꯂꯝꯕ ꯌꯥꯏ ꯍꯥꯏꯕꯒꯤ ꯂꯪꯂꯥ ꯂꯪꯖꯤꯟꯁꯨ ꯐꯪꯕ ꯉꯝꯂꯝꯃꯤ꯫ ꯁꯨꯄꯔꯑꯥꯏꯑꯣꯅꯤꯛ ꯋꯥꯇꯔ ꯍꯥꯏꯕꯁꯤ ‘ꯍꯣꯠ, ꯕ꯭ꯂꯦꯛ ꯑꯥꯏꯁ’ ꯍꯥꯏꯅꯁꯨ ꯈꯪꯅꯕ, ꯀꯥ ꯍꯦꯟꯅ ꯋꯥꯡꯕ ꯇꯦꯝꯄꯦꯔꯦꯆꯔ ꯑꯃꯁꯨꯡ ꯄ꯭ꯔꯦꯁꯔꯗ ꯂꯩꯕ ꯏꯁꯤꯡꯒꯤ ꯐꯦꯖ ꯑꯃꯅꯤ꯫ ꯑꯁꯤꯒꯨꯝꯕ ꯀꯥ ꯍꯦꯟꯅ ꯋꯥꯡꯂꯕ ꯐꯤꯚꯝꯁꯤꯡ ꯑꯁꯤꯗ, ꯏꯁꯤꯡꯒꯤ ꯃꯣꯂꯤꯀ꯭ꯌꯨꯜꯁꯤꯡꯅ ꯀꯥꯏꯊꯔꯛꯏ; ꯑꯣꯛꯁꯤꯖꯦꯟ ꯑꯦꯇꯝꯁꯤꯡꯅ ꯀ꯭ꯔꯤꯁꯇꯜ ꯂꯥꯇꯤꯁ ꯑꯃ ꯁꯦꯝꯂꯛꯏ ꯑꯗꯨꯒ ꯍꯥꯏꯗ꯭ꯔꯣꯖꯦꯟꯒꯤ ꯅ꯭ꯌꯨꯀ꯭ꯂꯤꯌꯁꯁꯤꯡꯅ ꯃꯅꯤꯡ ꯇꯝꯅ ꯇꯥꯎꯗꯨꯅ ꯂꯩ꯫ ꯑꯁꯤꯒꯨꯝꯕ ꯃꯅꯤꯡ ꯇꯝꯅ ꯇꯥꯎꯗꯨꯅ ꯂꯩꯔꯤꯕ
ꯅ꯭ꯌꯨꯀ꯭ꯂꯤꯌꯁꯤꯡꯁꯤꯗ ꯏꯂꯦꯛꯇ꯭ꯔꯤꯛ ꯆꯥꯔꯖ ꯄꯨꯕꯅꯤꯅ ꯁꯨꯄꯔꯑꯥꯏꯑꯣꯅꯤꯛ
ꯋꯥꯇꯔ ꯐꯥꯎꯗꯨꯅ ꯀꯔꯦꯟꯠ ꯆꯦꯟꯕ ꯉꯝꯃꯤ ꯑꯗꯨꯒ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯗ
ꯂꯩꯔꯤꯕ ꯇꯣꯞ-ꯇꯣꯞꯄ ꯃꯦꯒ꯭ꯅꯦꯇꯤꯛ ꯐꯤꯜꯗꯁꯤꯡꯗꯨ ꯁꯟꯗꯣꯛꯅ ꯇꯥꯛꯄ
ꯉꯝꯍꯜꯂꯤ꯫ ꯑꯁꯨꯝꯅ ꯄꯨꯊꯣꯔꯛꯂꯤꯕꯁꯤꯅ ꯑꯔꯥꯞꯄ ꯒꯂꯦꯛꯁꯤꯁꯤꯡꯗ
ꯂꯩꯔꯤꯕ ꯒ꯭ꯔꯍꯁꯤꯡꯒꯤ ꯃꯔꯝꯗ ꯅꯩꯅꯕꯗꯁꯨ ꯍꯦꯟꯅ ꯈꯨꯗꯣꯡꯆꯥꯍꯜꯂꯒꯅꯤ꯫
ꯃꯔꯝꯗꯤ ꯁꯣꯂꯔ ꯁꯤꯁꯇꯝꯒꯤ ꯋꯥꯡꯃꯗ ꯂꯩꯔꯤꯕ ꯑꯦꯛꯁꯣꯄ꯭ꯂꯥꯅꯦꯠꯁꯤꯡꯒꯤ
ꯑꯌꯥꯝꯕꯗꯤ ꯎꯟꯁꯤꯡꯒꯤ ꯒ꯭ꯔꯍꯁꯤꯡꯅꯤ꯫
ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯗ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯅꯣꯡ ꯆꯨꯔꯤꯕꯁꯤꯒꯤ
ꯃꯔꯝꯗ ꯊꯤꯖꯤꯟꯈꯤꯕ ꯑꯁꯤꯅ ꯃꯃꯜ ꯍꯣꯡꯅ ꯐꯪꯕ PET
ꯄ꯭ꯂꯥꯁꯇꯤꯛꯁꯤꯡꯗꯒꯤ ꯂꯦꯖꯔ-ꯗ꯭ꯔꯤꯚꯟ ꯁꯣꯛ ꯀꯝꯄ꯭ꯔꯦꯁꯔ ꯇꯧꯔꯒ
ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡꯄꯨꯊꯣꯛꯅꯕꯒꯤ ꯂꯝꯕꯤ ꯌꯥꯠꯄ ꯉꯝꯂꯦ ꯍꯥꯏꯔꯤ꯫
ꯍꯥꯟꯅꯗꯒꯤ ꯍꯧꯅ ꯄꯣꯠ ꯆꯩ ꯅꯥꯟꯊꯣꯛꯄ, ꯀꯛꯊꯠꯄ ꯑꯃꯁꯨꯡ ꯄꯣꯂꯤꯁꯤꯡ
ꯑꯦꯖꯦꯟꯠꯁꯤꯡ ꯑꯣꯏꯅ ꯁꯤꯖꯤꯟꯅꯔꯛꯂꯕ ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡꯁꯤꯗ
ꯀ꯭ꯋꯥꯟꯇꯝ ꯁꯦꯟꯁꯔꯁꯤꯡ, ꯃꯦꯗꯤꯀꯦꯜ ꯀꯟꯇ꯭ꯔꯥꯁꯠ ꯑꯦꯖꯦꯟꯠ ꯑꯃꯁꯨꯡ ꯃꯊꯛꯇ ꯑꯁꯤꯒꯨꯝꯕ ꯄꯥꯝꯕꯩꯁꯤꯡꯅ ꯁꯨꯡꯂꯛꯂꯤꯕ ꯅꯥꯅꯣꯗꯥꯏꯃꯟꯗꯁꯤꯡꯕꯨ ꯗ꯭ꯔꯒ ꯗꯦꯂꯤꯚꯔꯤ, ꯅꯣꯟꯏꯟꯚꯦꯁꯤꯚ ꯁꯔꯖꯔꯤ, ꯁꯁꯇꯦꯅꯦꯕꯜ ꯃꯦꯅ꯭ꯌꯨꯐꯦꯛꯆꯔꯤꯡ ꯑꯃꯁꯨꯡ ꯀ꯭ꯋꯥꯟꯇꯝ ꯏꯂꯦꯛꯇ꯭ꯔꯣꯅꯤꯛꯁꯅꯆꯤꯡꯕꯗꯁꯨ ꯁꯤꯖꯤꯟꯅꯕ ꯌꯥꯒꯅꯤ ꯍꯥꯏꯔꯤ꯫ ꯃꯈꯥ ꯇꯥꯔꯛꯄ ꯆꯥꯡꯌꯦꯡꯗ ꯊꯤꯖꯤꯟ ꯂꯨꯞ ꯑꯁꯤꯅ ꯁꯥꯀꯣꯛ ꯑꯃꯁꯨꯡ ꯁꯥꯃꯩꯗ ꯃꯔꯥꯡ ꯀꯥꯏꯅ ꯐꯪꯂꯤꯕ ꯏꯊꯥꯅꯣꯜ, ꯏꯁꯤꯡ ꯑꯃꯁꯨꯡ ꯑꯦꯃꯣꯅꯤꯌꯥꯒꯤ ꯁꯦꯝꯄꯜꯁꯤꯡ ꯁꯤꯖꯤꯟꯅꯔꯒ ꯍꯥꯟꯅꯒꯨꯝꯅ ꯆꯥꯡꯌꯦꯡꯁꯤꯡ ꯄꯥꯡꯊꯣꯛꯅꯕ ꯁꯦꯝ ꯁꯥꯔꯤ꯫ ꯃꯗꯨꯅ ꯑꯇꯣꯞꯄ ꯒ꯭ꯔꯍꯁꯤꯡꯗ ꯗꯥꯏꯃꯟꯗꯒꯤ ꯅꯣꯡꯁꯤ ꯀꯔꯝꯅ ꯆꯨꯔꯛꯂꯤꯕꯅꯣ ꯍꯥꯏꯕꯗꯨꯒꯤ ꯃꯇꯥꯡꯗ ꯍꯦꯟꯅ ꯀꯨꯞꯅ ꯈꯪꯕ ꯉꯝꯍꯜꯂꯕ ꯌꯥꯔꯤ꯫ =

ꯑꯩꯒꯤ ꯅꯨꯄꯤꯅ ꯃꯁꯥꯒꯤ ꯆꯍꯤ 28 ꯃꯨꯛ ꯁꯨꯔꯛꯄ
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ꯍꯦꯟꯕꯒꯤ ꯑꯅꯥꯕ ꯑꯃ ꯅꯥꯕ ꯍꯧꯔꯛꯈꯤꯕꯗꯨ꯫ ꯆꯥꯔꯤꯃꯈꯩ ꯃꯁꯥ ꯇꯦꯛꯈꯠꯇꯕ ꯑꯗꯨꯒ ꯏꯁꯤꯡ ꯇꯣꯏꯅ ꯆꯠꯂꯛꯄꯗꯒꯤ ꯈꯪꯂꯛꯈꯤꯕꯅꯤ꯫ ꯀꯔꯝꯕ ꯆꯤꯟꯖꯥꯛ ꯆꯥꯔꯨꯕꯗꯒꯤ ꯇꯧꯈ꯭ꯔꯤꯕꯅꯣ ꯍꯥꯏꯕ ꯑꯩꯈꯣꯏꯁꯨ ꯆꯃꯝꯅꯁꯤ꯫ ꯀꯅꯥꯒꯨꯝꯕ ꯗꯥꯛꯇꯔꯁꯤꯡꯅꯗꯤ ꯑꯩꯒꯤ ꯏꯆꯥ ꯑꯅꯤꯃꯛ ꯃꯕꯨꯛꯇ ꯂꯦꯜꯂꯒ ꯄꯣꯛꯈꯤꯕ ꯉꯥꯛꯇꯅꯤꯅ ꯑꯅꯤꯁꯨꯕ ꯏꯆꯥꯅꯨꯄꯤ ꯑꯇꯣꯝꯕꯤ ꯑꯁꯤ ꯄꯣꯛꯄꯗ ꯑꯁꯣꯏꯕ ꯂꯩꯈꯤꯕꯔꯥ ꯍꯥꯏꯕꯒꯤ ꯆꯤꯡꯅꯕꯁꯨ ꯐꯣꯡꯗꯣꯛꯄꯤ꯫ ꯃꯇꯝ ꯆꯥꯅ ꯗꯥꯛꯇꯔꯒꯤ ꯃꯅꯥꯛꯇ ꯆꯠꯇꯨꯅ ꯇꯥꯅꯈꯤ꯫ ꯃꯁꯥꯒꯤ ꯆꯍꯤ 28 ꯇ ꯁꯨꯔꯕꯤ ꯃꯤꯁꯛ ꯑꯃꯗ ꯏꯁꯤꯡ ꯄꯨꯛꯆꯠꯅ ꯅꯥꯔꯝꯒꯅꯤ ꯍꯥꯏꯕꯁꯤ ꯂꯥꯌꯦꯡꯂꯤꯕ ꯗꯥꯛꯇꯔꯁꯤꯡꯒꯤ ꯋꯥꯈꯜꯂꯣꯟꯗꯁꯨ ꯊꯥꯖꯕ ꯈꯔ ꯑꯗꯨꯝ ꯋꯥꯠꯂꯝꯃꯤ꯫ ꯃꯔꯝ ꯑꯗꯨꯅ ꯑꯩꯈꯣꯏꯁꯨ ꯌꯥꯔꯤꯃꯈꯩ ꯃꯅꯥ ꯃꯁꯤꯡꯅ ꯁꯦꯝꯕ ꯍꯤꯗꯥꯛ ꯂꯥꯡꯊꯛ ꯁꯤꯖꯤꯟꯅꯅꯕ ꯍꯣꯠꯅꯔꯝꯃꯤ꯫ ꯃꯇꯝ ꯑꯗꯨꯗ ꯑꯩꯈꯣꯏꯒꯤ ꯂꯩꯀꯥꯏꯗ ꯇꯣꯉꯥꯟ ꯇꯣꯉꯥꯟꯕ ꯂꯜꯂꯣꯟꯕꯁꯤꯡꯒꯤ ꯃꯈꯜ ꯃꯈꯥꯒꯤ ꯑꯅꯥꯕꯁꯤꯡ ꯐꯩ ꯍꯥꯏꯅꯕ ꯍꯤꯗꯥꯛ ꯈꯔ ꯄꯨꯁꯤꯟꯅꯔꯛꯈꯤ꯫ ꯑꯅꯥꯕ ꯐꯍꯟꯅꯤꯡꯕ ꯀꯧꯕꯅꯤꯅ, ꯑꯅꯥꯕꯇꯕꯨ ꯐꯔꯕꯗꯤ ꯍꯥꯏꯕ ꯋꯥꯈꯜꯁꯤꯗ ꯂꯨꯄꯥ ꯂꯤꯁꯤꯡ ꯂꯤꯁꯤꯡ ꯇꯤꯡꯗꯨꯅ ꯍꯤꯗꯥꯛꯁꯤꯡ ꯑꯗꯨ ꯁꯤꯖꯤꯟꯅꯗꯨꯅ ꯌꯦꯡꯈꯤ꯫ ꯑꯗꯨꯕꯨ ꯑꯔꯦꯝꯕꯗ ꯁꯦꯜ ꯇꯤꯡꯕꯇ ꯏꯁꯔꯨꯛ ꯑꯣꯏꯈꯤ, ꯀꯔꯤꯁꯨ ꯀꯥꯟꯅꯕ ꯐꯪꯈꯤꯗꯦ꯫ ꯑꯍꯣꯏꯅꯗꯨ ꯑꯅꯥꯕ ꯍꯦꯟꯖꯤꯜꯂꯛꯈꯤ꯫ ꯑꯗꯨꯕꯨ ꯗꯥꯛꯇꯔꯁꯤꯡꯒꯤ ꯃꯅꯥꯛꯇ ꯆꯠꯇꯨꯅ ꯑꯦꯂꯣꯄꯦꯊꯤꯒꯤ ꯍꯤꯗꯥꯛ ꯊꯥꯗꯨꯅ ꯄꯨꯟꯁꯤꯒꯤ ꯂꯣꯏꯅꯔꯒꯗꯕ ꯑꯅꯥꯕ ꯑꯗꯨꯒꯤ ꯂꯥꯏꯑꯣ ꯐꯥꯊꯅꯕ ꯍꯣꯠꯅꯔꯦ꯫

ꯆꯍꯤ 8/9 ꯃꯨꯛꯀꯤ ꯃꯇꯨꯡ ꯅꯣꯡꯃ ꯑꯌꯨꯛ ꯑꯃꯗꯅꯤ, ꯑꯩꯒꯤ ꯌꯨꯝꯒꯤ ꯊꯣꯡꯒꯥꯜ ꯃꯌꯥꯗ ꯑꯩꯒꯤ ꯅꯨꯄꯤꯅ ꯈꯣꯡꯕꯥꯟ ꯃꯄꯥꯟꯗ ꯍꯧꯕ ꯄꯥꯡꯈꯣꯛꯂꯥꯁꯤꯡ ꯍꯥꯏꯗꯣꯛꯂꯨꯕꯗ ꯃꯍꯥꯛꯀꯤ ꯃꯃꯤꯠ ꯌꯦꯠ ꯊꯪꯕꯔꯣꯝꯗ ꯏꯪ ꯏꯪ ꯂꯥꯎꯕ ꯃꯍꯤ ꯈꯔ ꯆꯣꯡꯈꯤꯕꯒꯨꯝ ꯇꯧꯈꯤ꯫ ꯅꯨꯃꯤꯠ ꯑꯗꯨꯒꯤ ꯃꯍꯥꯛꯀꯤ ꯃꯤꯠꯇ ꯅꯨꯡꯉꯥꯏꯇꯕ ꯍꯥꯏꯕꯗꯨ ꯑꯗꯨꯝ ꯑꯣꯏꯈꯤ꯫ ꯔꯤꯖꯅꯦꯜ ꯏꯟꯁꯇꯤꯇ꯭ꯌꯨꯠ ꯑꯣꯐ ꯃꯦꯗꯤꯀꯦꯜ ꯁꯥꯏꯟꯁꯦꯁ ꯏꯝꯐꯥꯜꯗ ꯆꯠꯇꯨꯅ ꯌꯦꯡꯊꯣꯛꯂꯨꯏ꯫ ꯑꯗꯨꯕꯨ ꯃꯤꯠꯀꯤ ꯗꯥꯛꯇꯔ ꯃꯀꯣꯛ ꯑꯣꯏꯔꯤꯕ ꯑꯗꯨꯅ ꯃꯇꯝ ꯈꯔ ꯉꯥꯏꯔꯣ, ꯃꯤꯠꯇ ꯍꯤꯗꯥꯛ ꯀꯥꯞꯀꯗꯕꯅꯤ, ꯍꯤꯗꯥꯛꯇꯨ ꯃꯃꯜ ꯇꯥꯡꯏ, ꯑꯅꯥꯕ 7/8 ꯁꯨꯔꯛꯄ ꯃꯇꯝꯗ ꯂꯨꯄꯥ ꯂꯤꯁꯤꯡ 10/10 ꯈꯥꯏꯅꯔꯒ ꯂꯟꯅꯥꯏ ꯂꯥꯌꯦꯡꯁꯪ ꯑꯃꯗ ꯇꯧꯒꯗꯕꯅꯤ, ꯃꯇꯝ ꯆꯥꯅ ꯄꯥꯎ ꯄꯤꯔꯛꯀꯦ ꯍꯥꯏꯗꯨꯅ ꯃꯣꯕꯥꯏ ꯅꯝꯕꯔ ꯂꯧꯍꯧꯔꯦ꯫ ꯑꯗꯨꯒ ꯂꯥꯌꯦꯡꯕ ꯍꯧꯔꯤꯕꯅꯤ ꯍꯥꯏꯗꯨꯅ ꯁꯤꯟꯗꯝꯂꯤꯕ ꯃꯤꯑꯣꯏ ꯈꯔꯅ ꯁꯣꯛꯂꯤꯕ ꯃꯤꯠ ꯌꯦꯠ ꯑꯗꯨꯗ ꯔꯦꯖꯔ ꯀꯥꯞꯇꯨꯅ ꯂꯥꯌꯦꯡꯕ ꯍꯧꯔꯛꯏ꯫ ꯅꯨꯃꯤꯠ ꯀꯌꯥꯅꯤꯃꯨꯛ ꯉꯥꯏꯒꯗꯒꯦ ꯍꯪꯂꯨꯕꯗ ꯀꯨꯏꯒꯗꯕ ꯅꯠꯇꯦ ꯍꯥꯏꯗꯨꯅ ꯇꯥꯛꯄꯤꯔꯛꯏ꯫ ꯑꯁꯨꯝ ꯉꯥꯏꯅ ꯉꯥꯏꯅ ꯊꯥ 6 ꯃꯨꯛ ꯍꯧꯈ꯭ꯔꯦ꯫ ꯑꯃꯨꯛ ꯍꯟꯅ ꯔꯤꯝꯁ ꯆꯠꯇꯨꯅ ꯗꯥꯛꯇꯔꯁꯨ ꯎꯅꯗꯨꯅ ꯑꯀꯨꯞꯄ ꯄꯥꯎ ꯂꯧꯅꯅꯕ ꯍꯣꯠꯅꯔꯦ꯫ ꯃꯗꯨꯗꯁꯨ ꯃꯤꯠꯇ ꯔꯦꯖꯔ ꯀꯥꯞꯄꯤꯔꯒ ꯊꯦꯝꯗꯨꯅ ꯃꯇꯝ ꯊꯥꯗꯨꯅ ꯊꯥꯗꯣꯔꯛꯂꯦ꯫ ꯑꯗꯨꯕꯨ ꯄꯥꯎꯗꯤ ꯄꯤꯔꯛꯄ ꯂꯩꯈꯤꯗꯔꯦ꯫ ꯅꯣꯡꯃ ꯑꯌꯨꯛ ꯑꯉꯟꯕ ꯅꯨꯃꯤꯠ ꯑꯃꯗ ꯗꯥꯛꯇꯔꯗꯨꯒꯤ ꯃꯌꯨꯝ ꯊꯤꯗꯨꯅ ꯎꯅꯔꯨꯏ꯫ ꯅꯨꯃꯤꯠ ꯑꯗꯨꯗꯁꯨ ꯅꯨꯃꯤꯠ ꯈꯔꯅꯤꯗꯪ ꯉꯥꯏꯔꯦ ꯍꯥꯏꯔꯛꯈꯤ꯫ ꯂꯥꯏꯕꯛ ꯊꯤꯕꯗꯤ ꯊꯥ ꯀꯌꯥ ꯉꯥꯏꯔꯕꯁꯨ ꯍꯤꯗꯥꯛ ꯀꯥꯞꯅꯕꯒꯤ ꯄꯥꯎ ꯑꯃꯨꯛ ꯍꯟꯅ ꯍꯥꯏꯔꯛꯈꯤꯗ꯭ꯔꯦ꯫ ꯑꯩꯈꯣꯏ ꯍꯥꯟꯅꯒꯤ ꯗꯥꯛꯇꯔꯗꯨꯒꯤ ꯃꯅꯥꯛꯇ ꯑꯃꯨꯛ ꯍꯟꯅ ꯆꯪꯗꯅꯕ ꯋꯥ ꯈꯟꯅꯔꯦ꯫ ꯑꯗꯨꯒꯤ ꯃꯍꯨꯠꯇ ꯃꯅꯤꯄꯨꯔꯒꯤ ꯃꯃꯤꯡ ꯂꯩꯔꯕ ꯂꯟꯅꯥꯏ ꯂꯥꯌꯦꯡꯁꯪ ꯑꯃꯗ ꯑꯃꯨꯛ ꯍꯟꯅ ꯏꯅꯧ
ꯅꯧꯅ ꯍꯥꯟꯅꯒꯤ ꯆꯦ ꯆꯥꯡꯁꯤꯡꯗꯨ ꯄꯨꯗꯨꯅ ꯂꯥꯌꯦꯡꯕ
ꯆꯠꯂꯦ꯫ ꯂꯥꯏꯕꯛ ꯊꯤꯕꯗꯤ ꯍꯥꯟꯅ ꯃꯇꯝ ꯀꯌꯥ
ꯃꯥꯡꯈ꯭ꯔꯕꯅꯤꯅ ꯉꯜꯂꯤꯉꯩꯗ ꯌꯦꯡꯍꯧꯗꯕꯒꯤ
ꯈꯔ ꯍꯦꯟꯅ ꯁꯣꯛꯆꯤꯜꯂꯝꯂꯦ꯫ ꯑꯗꯨꯒ ꯀꯥꯞꯈ꯭ꯔꯤ ꯔꯦꯖꯔ ꯑꯗꯨꯁꯨ ꯁꯤꯟꯗꯝꯂꯤꯕ ꯃꯍꯩꯔꯣꯏꯁꯤꯡꯅ ꯀꯥꯞꯂꯛꯈꯤꯕꯅ ꯑꯣꯏꯒꯗ꯭ꯔꯥ ꯈꯔ ꯁꯣꯏꯈ꯭ꯔꯦ ꯍꯥꯏꯅ ꯍꯥꯏꯔꯛꯂꯦ꯫ ꯃꯈꯥ ꯇꯥꯕ ꯂꯥꯌꯦꯡꯗꯗꯤ ꯁꯣꯛꯂꯤꯕ ꯃꯤꯠ ꯑꯗꯨ ꯑꯃꯨꯛ ꯍꯟꯅ ꯔꯦꯖꯔ ꯀꯥꯞꯇꯨꯅ ꯂꯥꯌꯦꯡꯕ ꯍꯧꯕꯤꯔꯛꯏ꯫ ꯔꯦꯖꯔ ꯀꯥꯞꯄ ꯑꯁꯤꯅ ꯁꯣꯛꯂꯕ ꯃꯤꯠꯀꯤ ꯁꯤꯡꯂꯤ ꯅꯥꯎꯔꯤꯁꯤꯡ ꯑꯗꯨ ꯀꯪꯁꯤꯜꯍꯟꯗꯨꯅ ꯑꯇꯣꯞꯄ ꯃꯐꯝꯗ ꯅꯧꯅ ꯁꯟꯗꯣꯔꯛꯇꯅꯕꯅꯤ ꯍꯥꯏꯔꯤ꯫ ꯑꯗꯨꯕꯨ ꯁꯣꯛꯂꯤꯕ ꯃꯤꯠ ꯑꯗꯨ ꯊꯥꯡ ꯊꯥꯗꯕ ꯌꯥꯗꯕꯒꯤ ꯐꯤꯚꯝꯗ ꯂꯩꯈ꯭ꯔꯦ꯫ ꯊꯥꯡꯒꯩꯁꯦꯡꯅ ꯊꯥꯡ ꯊꯥꯕ ꯍꯥꯏꯕꯁꯤ ꯑꯀꯤꯕ ꯐꯥꯎꯏ꯫ ꯃꯅꯤꯄꯨꯔꯒꯤ ꯂꯥꯌꯦꯡꯁꯪ ꯈꯔꯗ, ꯑꯗꯨꯒ ꯂꯟꯅꯥꯏ ꯂꯥꯌꯦꯡꯁꯪ ꯈꯔꯗ ꯃꯤꯠ ꯅꯥꯔꯕ ꯃꯤꯑꯣꯏ ꯈꯔ ꯊꯥꯡ ꯊꯥꯔꯨꯕꯗꯒꯤ ꯄꯨꯟꯁꯤ ꯆꯨꯞꯄ ꯃꯤꯠ ꯎꯈꯤꯗꯕꯒꯤ ꯄꯥꯎ ꯈꯔ ꯇꯥꯈꯤ꯫ ꯃꯗꯨꯅ ꯃꯔꯝ ꯑꯣꯏꯗꯨꯅ ꯃꯤꯠꯀꯤ ꯑꯅꯥꯕꯗ ꯊꯥꯡ ꯊꯥꯒꯅꯤ ꯍꯥꯏꯔꯕꯗꯤ ꯍꯦꯟꯅ ꯑꯀꯤꯕ ꯄꯣꯛꯏ꯫ ꯃꯔꯝ ꯑꯗꯨꯅ ꯌꯥꯔꯤꯕꯃꯈꯩ ꯊꯥꯡ ꯊꯥꯗꯅꯕꯒꯤꯗꯃꯛ ꯑꯇꯣꯞꯄ ꯗꯥꯛꯇꯔꯁꯤꯡꯒꯤ ꯃꯐꯝꯗꯁꯨ ꯆꯠꯇꯨꯅ ꯃꯈꯣꯏꯒꯤ ꯑꯣꯏꯕ ꯋꯥꯈꯜꯂꯣꯟ ꯂꯧꯅꯅꯕ ꯍꯣꯠꯅꯔꯝꯃꯤ꯫ ꯏꯝꯐꯥꯜ ꯏꯁꯠꯀꯤ ꯃꯐꯝ ꯑꯃꯗ ꯂꯩꯕ ꯃꯤꯠꯀꯤ ꯗꯥꯛꯇꯔ ꯅꯨꯄꯤ ꯑꯃꯗ ꯑꯃꯨꯛ ꯍꯟꯅ ꯏꯅꯧ ꯅꯧꯅ ꯇꯥꯅꯕ ꯆꯠꯂꯦ꯫ ꯗꯥꯛꯇꯔ ꯏꯕꯦꯝꯃ (ꯑꯁꯦꯡꯕ ꯃꯃꯤꯡ ꯅꯠꯇꯦ), ꯃꯤꯠ ꯂꯥꯌꯦꯡꯕꯗ ꯅꯧꯅ ꯃꯃꯤꯡ ꯂꯩꯈꯠꯛꯂꯤꯕꯤ ꯗꯥꯛꯇꯔ ꯑꯃꯅꯤ꯫ ꯇꯧꯏꯒꯨꯝꯕꯁꯨ ꯃꯍꯥꯛꯀꯤ ꯂꯥꯌꯦꯡꯐꯝ ꯑꯁꯤꯗꯗꯤ ꯈꯨꯠꯁꯨ ꯈꯨꯠꯂꯥꯏ ꯃꯃꯤꯡ ꯀꯌꯥ ꯁꯨꯗ꯭ꯔꯤꯕꯅꯤꯅ ꯃꯄꯥꯜ ꯂꯝꯒꯤ ꯑꯐꯕ ꯂꯟꯅꯥꯏ ꯂꯥꯌꯦꯡꯁꯪ ꯑꯃꯗ ꯊꯥꯕꯤꯔꯒꯦ ꯍꯥꯏꯔꯛꯏ꯫ ꯂꯝꯒꯤ ꯁꯟꯅ ꯃꯆꯤ ꯁꯥꯡꯏ ꯍꯥꯏꯅꯕꯒꯨꯝ ꯃꯄꯥꯜ ꯂꯝꯒꯤ ꯂꯥꯌꯦꯡꯁꯪꯗ ꯊꯥꯕꯤꯔꯗꯤ ꯁꯣꯏꯗꯅ ꯅꯥꯕ ꯐꯔꯅꯤ ꯍꯥꯏꯕꯒꯤ ꯊꯥꯖꯕꯁꯨ ꯂꯩꯔꯝꯃꯤ꯫ ꯗꯥꯛꯇꯔ ꯏꯕꯦꯝꯃꯅ ꯑꯩꯉꯣꯟꯗ ꯌꯥꯝꯅ ꯊꯥꯖꯅ ꯍꯥꯏꯔꯛꯈꯤ-

“ꯒꯨꯋꯥꯍꯥꯇꯤꯒꯤ ꯁꯪꯀꯔꯗꯦꯕ ꯅꯦꯈ꯭ꯔꯂꯌꯥ ꯍꯣꯁꯄꯤꯇꯥꯜ, ꯑꯩꯍꯥꯛꯅ ꯄꯤꯖꯤ ꯇꯧꯔꯛꯄ ꯃꯐꯝꯅꯤ꯫ ꯃꯐꯝ ꯑꯗꯨꯗ ꯂꯩꯕ ꯗꯥꯛꯇꯔꯁꯤꯡꯒ ꯑꯩꯒ ꯃꯥꯡꯖꯧꯅꯅ ꯄꯥꯎ ꯐꯥꯎꯅꯖꯔꯒꯦ꯫ ꯌꯥꯔꯤꯕꯃꯈꯩ ꯊꯨꯅ ꯃꯐꯝꯗꯨꯗ ꯆꯠꯅꯕ ꯍꯣꯠꯅꯕꯤꯌꯨ꯫ ꯌꯦꯠ ꯊꯪꯕ ꯃꯤꯠ ꯑꯁꯤ ꯃꯐꯝꯗꯨꯗ ꯊꯥꯡ ꯊꯥꯔꯕꯗꯤ ꯁꯣꯏꯗꯅ ꯐꯒꯅꯤ꯫” ꯑꯩꯒꯤ ꯃꯄꯥꯜ ꯂꯝꯗ ꯇꯣꯏꯅ ꯆꯠꯄ ꯃꯤꯁꯛꯁꯨ ꯅꯠꯇꯦ꯫ ꯏꯪꯂꯤꯁ ꯑꯣꯏꯔꯕꯁꯨ ꯍꯤꯟꯗꯤ ꯑꯣꯏꯔꯕꯁꯨ ꯂꯣꯜꯒꯤ ꯃꯇꯥꯡꯗꯁꯨ ꯌꯥꯝꯅ ꯈꯪꯕ ꯃꯤꯁꯛ ꯑꯃꯁꯨ ꯑꯣꯏꯗꯦ꯫ ꯑꯗꯨꯕꯨ ꯗꯥꯛꯇꯔ ꯏꯕꯦꯝꯃ ꯃꯥꯡꯖꯧꯅꯅ ꯄꯥꯎ ꯑꯃꯁꯨ ꯐꯥꯎꯅꯕꯤꯒꯦ ꯍꯥꯏꯔꯛꯄꯒ ꯂꯣꯏꯅꯅ ꯑꯩꯒꯤ ꯅꯨꯄꯤꯒꯤ ꯃꯤꯠꯀꯤ ꯑꯁꯣꯛꯄꯁꯤꯗ ꯐꯔꯕꯗꯤ ꯈꯟꯗꯨꯅ ꯑꯩꯍꯥꯛꯁꯨ ꯇꯉꯥꯏꯐꯗꯅ ꯆꯠꯄ ꯇꯥꯔꯤ꯫ ꯊꯥ ꯃꯈꯥꯏ ꯑꯃꯒꯤ ꯅꯨꯡꯗ ꯑꯩꯈꯣꯏ ꯆꯠꯅꯅꯕ ꯁꯦꯝ ꯁꯥꯔꯦ꯫ ꯃꯥꯡꯖꯧꯅꯅ ꯑꯩꯈꯣꯏ ꯑꯅꯤꯒꯤ ꯒꯨꯋꯥꯍꯥꯇꯤ ꯌꯣꯕ ꯕꯁꯀꯤ ꯇꯤꯀꯦꯠꯁꯨ ꯀꯛꯁꯤꯜꯂꯦ꯫
ꯀꯨꯝꯖꯥ 2014 ꯒꯤ ꯖꯨꯟ 7 ꯅꯤ꯫ ꯑꯩꯈꯣꯏ ꯑꯅꯤ ꯈ꯭ꯋꯥꯏꯔꯝꯕꯟꯗ ꯀꯩꯊꯦꯜ ꯐꯥꯎꯕ ꯑꯣꯇꯣꯔꯤꯛꯁꯣ ꯇꯣꯡꯂꯛꯂꯕ ꯃꯇꯨꯡꯗ ꯈ꯭ꯋꯥꯏꯔꯝꯕꯟꯗꯒꯤ ꯔꯤꯛꯁꯣ ꯇꯣꯡꯗꯨꯅ ꯑꯋꯥꯡ ꯑꯦ ꯑꯣ ꯁꯤꯒꯤ ꯒꯥꯔꯤ ꯊꯥꯐꯝ ꯇꯥꯟꯅ ꯂꯥꯛꯂꯦ꯫ ꯌꯥꯝꯅ ꯅꯣꯛꯅꯤꯡꯕ ꯊꯧꯗꯣꯛ ꯑꯃ ꯊꯦꯡꯅꯩ꯫ ꯖꯋꯥꯍꯔꯂꯥꯜ ꯅꯦꯍꯔꯨ ꯃꯅꯤꯄꯨꯔ ꯗꯥꯟꯁ ꯑꯦꯀꯥꯗꯦꯃꯤꯒꯤ ꯆꯪꯐꯝ ꯃꯄꯥ ꯌꯧꯔꯛꯄ ꯑꯗꯨꯋꯥꯏꯗꯒꯤ ꯅꯨꯄꯥ ꯑꯃꯅ ꯒꯥꯔꯤ ꯃꯆꯥ ꯑꯃꯗ ꯔꯤꯛꯁꯣꯒꯤ ꯃꯇꯨꯡ ꯏꯟꯅꯔꯛꯂꯒ ꯑꯩꯈꯣꯏꯗꯒꯤ ꯍꯦꯟꯒꯠꯂꯛꯂꯒ ꯍꯥꯏꯔꯛꯏ- “ꯀꯗꯥꯏ ꯌꯧꯕꯤꯒꯗꯕꯅꯣ
ꯆꯠꯄꯤꯔꯤꯕꯁꯤꯕꯣ?” =

SLAC ꯒꯤ Linac Coherent Light Source ꯇ ꯂꯩꯔꯤꯕ ꯃꯦꯠꯔ ꯏꯟ ꯑꯦꯛꯇ꯭ꯔꯤꯝ ꯀꯟꯗꯤꯁꯟꯁ ꯏꯟꯁꯇ꯭ꯔꯨꯃꯦꯟꯠ

Dominik Kraus

- ÿ- ꯃꯣꯏꯔꯥꯡꯊꯦꯝ ꯅꯦꯇ꯭ꯔꯖꯤꯠ ꯃꯤꯇꯩ -ÿ-