

PSALTer results panel

Wave operator and propagator

$1^+ \mathcal{W}_a^{\parallel} \dagger^{\alpha\beta}$

$1^+ \mathcal{W}_a^{\perp} \dagger^{\alpha\beta}$

$1^+ \mathcal{W}_s^{\perp} \dagger^{\alpha\beta}$

$1^- \mathcal{T}^{\perp}_{\alpha}$

$1^- \mathcal{W}_a^{\parallel} \dagger_{\alpha}$

$1^- \mathcal{W}_a^{\perp} \dagger_{\alpha}$

$1^- \mathcal{W}_s^{\perp t} \dagger_{\alpha}$

$1^- \mathcal{W}_s^{\parallel t} \dagger_{\alpha}$

$1^- \mathcal{W}_s^{\perp h} \dagger_{\alpha}$

$1^- \mathcal{W}_s^{\parallel h} \dagger_{\alpha}$

$1^+ \mathcal{W}_a^{\parallel} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^+ \mathcal{W}_a^{\perp} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^+ \mathcal{W}_s^{\perp} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{T}^{\perp} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_a^{\parallel} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_a^{\perp} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_s^{\perp t} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_s^{\parallel t} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_s^{\perp h} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{W}_s^{\parallel h} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0

$1^+ \mathcal{A}_a^{\parallel} \dagger^{\alpha\beta}$

$1^+ \mathcal{A}_a^{\perp} \dagger^{\alpha\beta}$

$1^+ \mathcal{A}_s^{\perp} \dagger^{\alpha\beta}$

$1^- \mathcal{H}^{\perp}_{\alpha}$

$1^- \mathcal{A}_a^{\parallel} \dagger_{\alpha}$

$1^- \mathcal{A}_a^{\perp} \dagger_{\alpha}$

$1^- \mathcal{A}_s^{\perp t} \dagger_{\alpha}$

$1^- \mathcal{A}_s^{\parallel t} \dagger_{\alpha}$

$1^- \mathcal{A}_s^{\perp h} \dagger_{\alpha}$

$1^- \mathcal{A}_s^{\parallel h} \dagger_{\alpha}$

$1^+ \mathcal{A}_a^{\parallel} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^+ \mathcal{A}_a^{\perp} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^+ \mathcal{A}_s^{\perp} \dagger^{\alpha\beta}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{H}^{\perp} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_a^{\parallel} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_a^{\perp} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_s^{\perp t} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_s^{\parallel t} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_s^{\perp h} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0
$1^- \mathcal{A}_s^{\parallel h} \dagger^{\alpha}$	0	0	0		0	0	0	0		0	0	0

$2^+ \mathcal{T}^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_a^{\parallel} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_s^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_s^{\parallel} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_a^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_s^{\perp t} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_s^{\parallel t} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_a^{\perp h} \dagger^{\alpha\beta}$

$2^+ \mathcal{W}_s^{\parallel h} \dagger^{\alpha\beta}$

$2^+ \mathcal{T}^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_a^{\parallel} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_s^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_s^{\parallel} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_a^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_s^{\perp t} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_s^{\parallel t} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_a^{\perp h} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{W}_s^{\parallel h} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0

$2^+ \mathcal{H}^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_a^{\parallel} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_s^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_s^{\parallel} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_a^{\perp} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_s^{\perp t} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_s^{\parallel t} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_a^{\perp h} \dagger^{\alpha\beta}$

$2^+ \mathcal{A}_s^{\parallel h} \dagger^{\alpha\beta}$

$2^+ \mathcal{H}^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_a^{\parallel} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_s^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_s^{\parallel} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_a^{\perp} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_s^{\perp t} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_s^{\parallel t} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_a^{\perp h} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0
$2^+ \mathcal{A}_s^{\parallel h} \dagger^{\alpha\beta}$	0	0	0	0	0	0	0	0	0

$0^+ \mathcal{T}^{\perp}$

$0^+ \mathcal{T}^{\parallel}$

$0^+ \mathcal{W}_a^{\parallel}$

$0^+ \mathcal{W}_s^{\perp t}$

$0^+ \mathcal{W}_s^{\parallel}$

$0^+ \mathcal{W}_s^{\perp h}$

$0^+ \mathcal{W}_a^{\parallel}$

$0^+ \mathcal{H}^{\perp}$

$0^+ \mathcal{H}^{\parallel}$

$0^+ \mathcal{A}_a^{\parallel}$

$0^+ \mathcal{A}_s^{\perp t}$

$0^+ \mathcal{A}_s^{\parallel}$

$0^+ \mathcal{A}_s^{\perp h}$

$0^+ \mathcal{A}_a^{\parallel}$

$S =$   
TTTT Ter  
minat  
edEv-  
aliuti  
onl  
lterat  
ionl  
mitl  
t, x,  
y, z]  
d z d i  
d x d t

$3^- \mathcal{W}_s^{\parallel} \dagger^{\alpha\beta\chi}$   
0

$3^- \mathcal{A}_s^{\parallel} \dagger^{\alpha\beta\chi}$   
0

Massive and massless spectra

$k^{\mu} = (p, 0, 0, p)$

$?$

$?$

$?$

$?$

$?$

Massless particle

Pole residue:  $0 < \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} \&\& \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} > 0$

Polarisations: 1

(No particles)

$k^{\mu} = (p, 0, 0, p)$

$?$

$?$

$?$

$?$

$?$

Quartic pole

Pole residue:  $0 < \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} \&\& \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} > 0$

Polarisations: 1

$k^{\mu} = (p, 0, 0, p)$

$?$

$?$

$?$

$?$

$?$

Hexic pole

Pole residue:  $0 < \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} \&\& \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} > 0$

Polarisations: 1

Unitarity conditions

Reduce[  
Join[False, Eigenvalues[ $0 < \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} \&\& \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} > 0, 0 < \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} \&\& \{\{1\}, \{1\}\}.\{1\} \llbracket 1;; \frac{1}{2}, \frac{3}{2};; 1 \rrbracket.\{\{1\}, \{1\}\} > 0$ ],  
 $\{a_{00}, a_{01}, a_{02}, a_{03}, a_{04}, a_{05}, a_{06}, a_{07}, a_{08}, a_{09}, a_{010}, a_{011}, c_{01}, c_{02}, c_{03}, c_{04}, c_{05}, c_{06}, c_{07}, c_{08}, c_{09}, c_{010}, c_{011}, c_{012}, c_{013}, c_{014}, c_{015}, c_{016}\}$