Step	Algorithm:		
1a			
4			
	where		
2			
3	while do		
2,3		٨	
5a			
	where		
6			
8			
5b			
7			
2			
	endwhile		
2,3		^ ¬(	)
1b			

Step	Algorithm: $[C] := \text{Syr2k\_LT\_BLK\_VAr3}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle  A_R\right), B \to \left(B_L \middle  B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle  C_{BR}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \wedge n(A_L) < n(A) $
5a	Determine block size b
	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \rightarrow$
	$\left( \frac{C_{00} C_{01} C_{02}}{C_{01} C_{02}} \right)$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
	$C_{20} C_{21} C_{22}$ where $A_1$ has $b$ columns, $B_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\begin{pmatrix} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10} & \widehat{C}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{pmatrix}$
	$\left( \overline{C_{20}}   C_{21}   C_{22} \right) = \left( \overline{A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20}}   \widehat{C}_{21}   \widehat{C}_{22} \right)$
8	$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$
	$C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow$
	$\int C_{00}  C_{01}  C_{02}$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \end{pmatrix}$
	$C_{20} C_{21} C_{22}$
	$ \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10}   A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}   0 \\ A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20}   A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}   \widehat{C}_{22} \end{pmatrix} $
7	$ \left  \begin{array}{c c} C_{10}   C_{11}   C_{12} \\ \hline \end{array} \right  = \left  \begin{array}{c c} A_1^T B_0 + B_1^T A_0 + C_{10}   A_1^T B_1 + B_1^T A_1 + C_{11}   0 \\ \hline \end{array} \right  $
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Algorithm:  $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$ 

$$A \to \left(A_L \middle| A_R\right), B \to \left(B_L \middle| B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle| C_{BR}\right)$$

where  $A_L$  has 0 columns,  $B_L$  has 0 columns,  $C_{TL}$  is  $0 \times 0$ 

while  $n(A_L) < n(A)$  do

Determine block size b

$$\left( A_{L} \middle| A_{R} \right) \to \left( A_{0} \middle| A_{1} \middle| A_{2} \right) , \left( B_{L} \middle| B_{R} \right) \to \left( B_{0} \middle| B_{1} \middle| B_{2} \right) , \left( \frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \to \left( \frac{C_{00} \middle| C_{01} \middle| C_{02}}{C_{10} \middle| C_{11} \middle| C_{12}} \right)$$

where  $A_1$  has b columns,  $B_1$  has b columns,  $C_{11}$  is  $b \times b$ 

$$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$$

$$C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$$

$$\left( A_{L} \middle| A_{R} \right) \leftarrow \left( A_{0} \middle| A_{1} \middle| A_{2} \right), \left( B_{L} \middle| B_{R} \right) \leftarrow \left( B_{0} \middle| B_{1} \middle| B_{2} \right), \left( \frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \leftarrow \left( \frac{C_{00} \middle| C_{01} \middle| C_{02}}{C_{10} \middle| C_{11} \middle| C_{12}} \right)$$

endwhile

Step	Algorithm: $[C] := \text{Syr}2\text{K_Ltt_BLK_VAr}3(A, B, C)$
1a	$C = \hat{C}$
4	where
2	
3	while do
2,3	$\wedge$
5a	Determine block size
	where
6	
8	
5b	
7	
2	
	endwhile
2,3	$\wedge \neg ($
۷,0	
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$
1a	$C = \widehat{C}$
4	
2	where $ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}  \hat{C}_{TR} }{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}  \hat{C}_{BR} }\right) $
3	while do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \wedge $
5a	Determine block size
	where
6	
8	
5b	
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \land \neg ( $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$
1a	$C = \widehat{C}$
4	
	where
2	$\left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right)$
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	Determine block size
	where
6	
8	
5b	
7	
2	$\left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right)$
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \Big  C_{TR}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \Big  \widehat{C}_{TR}\right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k\_lt}\_\text{Blk\_var3}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \begin{pmatrix} A_L   A_R \end{pmatrix}$ , $B \to \begin{pmatrix} B_L   B_R \end{pmatrix}$ , $C \to \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix}$ where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}  \widehat{C}_{TR}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}  \widehat{C}_{BR}}\right) \wedge n(A_L) < n(A) $
5a	Determine block size
	where
6	
Ü	
8	
5b	
7	
•	
	$\begin{pmatrix} C_{-1} & C_{-2} \end{pmatrix} \begin{pmatrix} A^T B_{-1} + B^T A_{-1} & \hat{C}_{-2} & \hat{C}_{-1} \end{pmatrix}$
2	$ \left(\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}   \widehat{C}_{TR}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}   \widehat{C}_{BR}}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k_{-}\operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$
1a	$C = \hat{C}$
4	$A \to \left(A_L \middle  A_R\right), B \to \left(B_L \middle  B_R\right), C \to \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \frac{C_{TR}}{C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}  \widehat{C}_{BR}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	Determine block size b
	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \rightarrow$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
	$ \begin{pmatrix} C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{pmatrix} $ where $A_1$ has $b$ columns, $B_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	
8	
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \leftarrow$
	· · · · · · · · · · · · · · · · · · ·
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
	$oxed{C_{20}C_{21}C_{22}}$
7	
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} C_{BR}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} \right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr2k.lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle  A_R\right), B \to \left(B_L \middle  B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle  C_{BR}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}} \begin{vmatrix} \hat{C}_{TR} \\ \hat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	Determine block size $b$
	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \rightarrow$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
	$ \begin{pmatrix} \frac{C_{10}  C_{11} C_{12}}{C_{20}  C_{21} C_{22}} \end{pmatrix} $ where $A_1$ has $b$ columns, $B_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\begin{pmatrix} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ \hline A_1^T B_0 + B_1^T A_0 + \hat{C}_{10} & \hat{C}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \hat{C}_{20} & \hat{C}_{21} & \hat{C}_{22} \end{pmatrix}$
8	
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
7	
2	$ \left(\frac{C_{TL} C_{TR}}{C_{BL} C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \hat{C}_{TL}  \hat{C}_{TR}}{A_R^T B_L + B_R^T A_L + \hat{C}_{BL}  \hat{C}_{BR}}\right) $
	endwhile
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr}2k \operatorname{lt}(A, B, \widehat{C})$

Step	Algorithm: $[C] := \text{Syr2k\_LT\_BLK\_VAr3}(A, B, C)$
1a	$C = \widehat{C}$
4	$A \to \left(A_L \middle  A_R\right), B \to \left(B_L \middle  B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle  C_{BR}\right)$
	where $A_L$ has 0 columns, $B_L$ has 0 columns, $C_{TL}$ is $0 \times 0$
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix}\right) $
3	while $n(A_L) < n(A)$ do
2,3	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}} \begin{vmatrix} \widehat{C}_{TR} \\ \widehat{C}_{BR} \end{vmatrix} \right) \wedge n(A_L) < n(A) $
5a	Determine block size b
	$\left(A_L \middle  A_R\right) \rightarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \rightarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \rightarrow$
	$egin{pmatrix} C_{00} & C_{01} & C_{02} \ \hline C_{10} & C_{11} & C_{12} \ \hline C_{20} & C_{21} & C_{22} \end{pmatrix}$
	$\begin{pmatrix} C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{pmatrix}$ where $A_1$ has $b$ columns, $B_1$ has $b$ columns, $C_{11}$ is $b \times b$
6	$\begin{pmatrix} C_{00} & C_{01} & C_{02} \\ \hline C_{10} & C_{11} & C_{12} \\ \hline C_{20} & C_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ \hline A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10} & \widehat{C}_{11} & 0 \\ \hline A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & \widehat{C}_{21} & \widehat{C}_{22} \end{pmatrix}$
8	
5b	$\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL}}{C_{BL}} \middle  C_{BR}\right) \leftarrow$
	$\int C_{00}  C_{01}  C_{02}$
	$\overline{C_{10} C_{11} C_{12}}$
	$oxed{C_{20}   C_{21}   C_{22}}$
	$\left( \frac{C_{00}   C_{01}   C_{02}}{C_{01}   C_{02}} \right)  \left( \frac{A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00}}{0} \right)  0  0$
7	$ \begin{pmatrix} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00} & 0 & 0 \\ A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10} & A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11} & 0 \\ A_2^T B_0 + B_2^T A_0 + \widehat{C}_{20} & A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21} & \widehat{C}_{22} \end{pmatrix} $
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) $
	endwhile
2	$ \left(\frac{C_{TL}}{C_{BL}} \begin{vmatrix} C_{TR} \\ C_{BL} \end{vmatrix} = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) \land \neg (n(A_L) < n(A)) $
1b	$[C] = \operatorname{Syr2k.lt}(A, B, \widehat{C})$

$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
$ \begin{array}{c} \text{where}  A_{L} \text{ has 0 columns, } B_{L} \text{ has 0 columns, } C_{TL} \text{ is 0} \times 0 \\ \hline 2  \left( \frac{C_{TL}}{C_{TR}}   C_{BR} \right) = \left( \frac{A_{L}^{T}B_{L} + B_{L}^{T}A_{L} + \hat{C}_{TL}}{A_{R}^{T}B_{L} + B_{L}^{T}A_{L} + \hat{C}_{BL}}   \hat{C}_{BR} \right) \\ \hline 3  \text{while } n(A_{L}) < n(A) \text{ do} \\ \hline 2,3  \left( \frac{C_{TL}}{C_{TR}}   C_{TR} \right) = \left( \frac{A_{L}^{T}B_{L} + B_{L}^{T}A_{L} + \hat{C}_{TL}}{A_{R}^{T}B_{L} + B_{L}^{T}A_{L} + \hat{C}_{BL}}   \hat{C}_{BR} \right) \wedge n(A_{L}) < n(A) \\ \hline 5a  \text{Determine block size } b \\ \left( A_{L}   A_{R} \right) \rightarrow \left( A_{0}   A_{1}   A_{2} \right) ,  \left( B_{L}   B_{R} \right) \rightarrow \left( B_{0}   B_{1}   B_{2} \right) ,  \left( \frac{C_{TL}}{C_{TR}}   C_{TR} \right) \\ \left( \frac{C_{00}}{C_{01}}   C_{02} \right) \\ \left( \frac{C_{10}}{C_{11}}   C_{12} \right) \\ \left( \frac{C_{20}}{C_{20}}   C_{21}   C_{22} \right) \\ \text{where } A_{1} \text{ has } b \text{ columns, } B_{1} \text{ has } b \text{ columns, } C_{11} \text{ is } b \times b \\ \hline 6  \left( \frac{C_{00}}{C_{01}}   C_{02} \right) \\ \left( \frac{C_{10}}{C_{11}}   C_{12} \right) \\ \left( \frac{C_{20}}{C_{20}}   C_{21}   C_{22} \right) \\ \left( \frac{A_{1}^{T}B_{0} + B_{1}^{T}A_{0} + \hat{C}_{10}}{A_{1}^{T}B_{0} + \hat{C}_{20}}   \hat{C}_{21}   \hat{C}_{22} \right) \\ \hline 8  C_{11} := A_{1}^{T}B_{1} + B_{1}^{T}A_{1} + \hat{C}_{11} \\ C_{21} := A_{2}^{T}B_{1} + B_{2}^{T}A_{1} + \hat{C}_{21} \\ \hline 5b  \left( A_{L}   A_{R} \right) \leftarrow \left( A_{0}   A_{1}   A_{2} \right) ,  \left( B_{L}   B_{R} \right) \leftarrow \left( B_{0}   B_{1}   B_{2} \right) ,  \left( \frac{C_{TL}}{C_{TR}}   C_{TR} \right) \leftarrow \\ \left( C_{00}   C_{01}   C_{02} \right) \\ \hline \end{array}$
$ \begin{array}{c} \text{where } A_L \text{ has 0 columns, } B_L \text{ has 0 columns, } C_{TL} \text{ is 0} \times 0 \\ \hline 2 & \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} = \begin{pmatrix} A_L^T B_L + B_L^T A_L + \hat{C}_{TL}   \hat{C}_{TR} \\ A_R^T B_L + B_L^T A_L + \hat{C}_{BL}   \hat{C}_{BR} \end{pmatrix} \\ \hline 3 & \text{while } n(A_L) < n(A) \text{ do} \\ \hline 2,3 & \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} = \begin{pmatrix} A_L^T B_L + B_L^T A_L + \hat{C}_{TL}   \hat{C}_{TR} \\ A_R^T B_L + B_R^T A_L + \hat{C}_{BL}   \hat{C}_{BR} \end{pmatrix} \wedge n(A_L) < n(A) \\ \hline 5a & \textbf{Determine block size } b \\ & (A_L   A_R) \rightarrow (A_0   A_1   A_2) , (B_L   B_R) \rightarrow (B_0   B_1   B_2) , \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} \rightarrow \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix} \\ & \text{where } A_1 \text{ has } b \text{ columns, } B_1 \text{ has } b \text{ columns, } C_{11} \text{ is } b \times b \\ \hline 6 & \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ A_1^T B_0 + B_1^T A_0 + \hat{C}_{10} & \hat{C}_{11} & 0 \\ A_2^T B_0 + B_2^T A_0 + \hat{C}_{20} & \hat{C}_{21} \hat{C}_{22} \end{pmatrix} \\ & 8 & C_{11} := A_1^T B_1 + B_1^T A_1 + \hat{C}_{11} \\ & C_{21} := A_2^T B_1 + B_2^T A_1 + \hat{C}_{21} \\ \hline 5b & (A_L   A_R) \leftarrow (A_0   A_1   A_2) , (B_L   B_R) \leftarrow (B_0   B_1   B_2) , \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} \leftarrow \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} \\ & \begin{pmatrix} C_{00}   C_{01}   C_{02}   C_{02}   C_{02} \end{pmatrix} \begin{pmatrix} C_{00}   C_{01}   C_{02}   C_{02}   C_{02}   C_{$
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5a Determine block size $b$ $ \begin{pmatrix} A_{L} A_{R}\rangle & \rightarrow & (A_{0} A_{1} A_{2}) & , & (B_{L} B_{R}) & \rightarrow & (B_{0} B_{1} B_{2}) & , & \frac{C_{TL} C_{TR} }{C_{BL} C_{BR}}\end{pmatrix} \rightarrow \\ \begin{pmatrix} C_{00} C_{01} C_{02} \\ C_{10} C_{11} C_{12} \\ C_{20} C_{21} C_{22}\end{pmatrix} & \text{where } A_{1} \text{ has } b \text{ columns, } B_{1} \text{ has } b \text{ columns, } C_{11} \text{ is } b \times b \end{pmatrix} $ $ \begin{pmatrix} C_{00} C_{01} C_{02} \\ C_{10} C_{11} C_{12} \\ C_{20} C_{21} C_{22}\end{pmatrix} = \begin{pmatrix} A_{0}^{T}B_{0} + B_{0}^{T}A_{0} + \hat{C}_{00} & 0 & 0 \\ A_{1}^{T}B_{0} + B_{1}^{T}A_{0} + \hat{C}_{10} & \hat{C}_{11} & 0 \\ A_{2}^{T}B_{0} + B_{2}^{T}A_{0} + \hat{C}_{20} & \hat{C}_{21} \hat{C}_{22}\end{pmatrix} $ $ 8  C_{11} := A_{1}^{T}B_{1} + B_{1}^{T}A_{1} + \hat{C}_{11} $ $ C_{21} := A_{2}^{T}B_{1} + B_{2}^{T}A_{1} + \hat{C}_{21} $ $ 5b  (A_{L} A_{R}) \leftarrow (A_{0} A_{1} A_{2}) , (B_{L} B_{R}) \leftarrow (B_{0} B_{1} B_{2}) , (C_{TL} C_{TR}) \leftarrow \begin{pmatrix} C_{TL} C_{TR} C_{TR}$
$ \begin{pmatrix} A_{L}   A_{R} \end{pmatrix} \rightarrow \begin{pmatrix} A_{0}   A_{1}   A_{2} \end{pmatrix},  \begin{pmatrix} B_{L}   B_{R} \end{pmatrix} \rightarrow \begin{pmatrix} B_{0}   B_{1}   B_{2} \end{pmatrix},  \begin{pmatrix} \frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}} \end{pmatrix} \rightarrow $ $ \begin{pmatrix} \frac{C_{00}   C_{01}   C_{02}}{C_{10}   C_{11}   C_{12}} \\ \frac{C_{20}   C_{21}   C_{22}}{C_{20}   C_{21}   C_{22}} \end{pmatrix} $ $ \text{where } A_{1} \text{ has } b \text{ columns, } B_{1} \text{ has } b \text{ columns, } C_{11} \text{ is } b \times b $ $ \begin{pmatrix} \frac{C_{00}   C_{01}   C_{02}}{C_{10}   C_{11}   C_{12}} \\ \frac{C_{10}   C_{11}   C_{12}}{C_{20}   C_{21}   C_{22}} \end{pmatrix} = \begin{pmatrix} \frac{A_{0}^{T} B_{0} + B_{0}^{T} A_{0} + \hat{C}_{00}   0   0}{A_{2}^{T} B_{0} + B_{2}^{T} A_{0} + \hat{C}_{10}   \hat{C}_{11}   0} \\ \frac{A_{2}^{T} B_{0} + B_{2}^{T} A_{0} + \hat{C}_{20}   \hat{C}_{21}   \hat{C}_{22}}{\hat{C}_{21}   \hat{C}_{22}} \end{pmatrix} $ $ 8 \qquad C_{11} := A_{1}^{T} B_{1} + B_{1}^{T} A_{1} + \hat{C}_{11} \\ C_{21} := A_{2}^{T} B_{1} + B_{2}^{T} A_{1} + \hat{C}_{21} $ $ 5b \qquad (A_{L}   A_{R}) \leftarrow (A_{0}   A_{1}   A_{2}) ,  (B_{L}   B_{R}) \leftarrow (B_{0}   B_{1}   B_{2}) ,  \begin{pmatrix} C_{TL}   C_{TR} \\ C_{BL}   C_{BR} \end{pmatrix} \leftarrow \begin{pmatrix} C_{00}   C_{01}   C_{02} \end{pmatrix} $
$ \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix} $ where $A_1$ has $b$ columns, $B_1$ has $b$ columns, $C_{11}$ is $b \times b$ $ \begin{pmatrix} C_{00}   C_{01}   C_{02} \\ C_{10}   C_{11}   C_{12} \\ C_{20}   C_{21}   C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ A_1^T B_0 + B_1^T A_0 + \hat{C}_{10} & \hat{C}_{11} & 0 \\ A_2^T B_0 + B_2^T A_0 + \hat{C}_{20} & \hat{C}_{21} & \hat{C}_{22} \end{pmatrix} $ $ 8 \qquad C_{11} := A_1^T B_1 + B_1^T A_1 + \hat{C}_{11} $ $ C_{21} := A_2^T B_1 + B_2^T A_1 + \hat{C}_{21} $ $ 5b \qquad (A_L   A_R) \leftarrow (A_0   A_1   A_2) , (B_L   B_R) \leftarrow (B_0   B_1   B_2) , (C_{TL}   C_{TR}) \leftarrow (C_{00}   C_{01}   C_{02}) $
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$ \begin{pmatrix} C_{00} & C_{01} & C_{02} \\ C_{10} & C_{11} & C_{12} \\ C_{20} & C_{21} & C_{22} \end{pmatrix} = \begin{pmatrix} A_0^T B_0 + B_0^T A_0 + \hat{C}_{00} & 0 & 0 \\ A_1^T B_0 + B_1^T A_0 + \hat{C}_{10} & \hat{C}_{11} & 0 \\ A_2^T B_0 + B_2^T A_0 + \hat{C}_{20} & \hat{C}_{21} & \hat{C}_{22} \end{pmatrix} $ $ 8 \qquad C_{11} := A_1^T B_1 + B_1^T A_1 + \hat{C}_{11} \\ C_{21} := A_2^T B_1 + B_2^T A_1 + \hat{C}_{21} $ $ 5b \qquad \left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) ,  \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) ,  \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow \begin{pmatrix} C_{00} \middle  C_{01} \middle  C_{02}\right) $
8 $C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$ $C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$ 5b $ \left( A_L \middle  A_R \right) \leftarrow \left( A_0 \middle  A_1 \middle  A_2 \right) ,  \left( B_L \middle  B_R \right) \leftarrow \left( B_0 \middle  B_1 \middle  B_2 \right) ,  \left( \frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}} \right) \leftarrow \left( C_{00} \middle  C_{01} \middle  C_{02} \right)$
8 $C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$ $C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$ 5b $ \left( A_L \middle  A_R \right) \leftarrow \left( A_0 \middle  A_1 \middle  A_2 \right) ,  \left( B_L \middle  B_R \right) \leftarrow \left( B_0 \middle  B_1 \middle  B_2 \right) ,  \left( \frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}} \right) \leftarrow \left( C_{00} \middle  C_{01} \middle  C_{02} \right)$
8 $C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$ 5b $\left(A_L \middle  A_R\right) \leftarrow \left(A_0 \middle  A_1 \middle  A_2\right) , \left(B_L \middle  B_R\right) \leftarrow \left(B_0 \middle  B_1 \middle  B_2\right) , \left(\frac{C_{TL} \middle  C_{TR}}{C_{BL} \middle  C_{BR}}\right) \leftarrow \left(C_{00} \middle  C_{01} \middle  C_{02}\right)$
$C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$ $(A_L   A_R) \leftarrow (A_0   A_1   A_2) , (B_L   B_R) \leftarrow (B_0   B_1   B_2) , (\frac{C_{TL}   C_{TR}}{C_{BL}   C_{BR}}) \leftarrow (C_{00}   C_{01}   C_{02})$
$\int C_{00}  C_{01}  C_{02}$
$oxed{C_{10}  C_{11}  C_{12}}$
$igg C_{20} C_{21} C_{22} igg $
$\left(\frac{C_{00} C_{01} C_{02}}{C_{00} C_{01} C_{02}}\right)  \left(\frac{A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00}}{C_{00} C_{00} C_{00}} = 0\right)$
$ \frac{C_{00} C_{01} C_{02}}{C_{10} C_{11} C_{12}} = \left( \frac{A_0^T B_0 + B_0^T A_0 + \widehat{C}_{00}}{A_1^T B_0 + B_1^T A_0 + \widehat{C}_{10} A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11} 0} - \frac{1}{A_1^T B_0 + B_2^T A_0 + \widehat{C}_{20} A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21} \widehat{C}_{22}} \right) $
$ \frac{2}{C_{TL}} \left( \frac{C_{TR}}{C_{BL}}   C_{TR} \right) = \left( \frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL}}   \widehat{C}_{BR} \right) $
endwhile
$2.3  \left(\frac{C_{TL} \mid C_{TR}}{C_{BL} \mid C_{BR}}\right) = \left(\frac{A_L^T B_L + B_L^T A_L + \widehat{C}_{TL} \mid \widehat{C}_{TR}}{A_R^T B_L + B_R^T A_L + \widehat{C}_{BL} \mid \widehat{C}_{BR}}\right) \land \neg (n(A_L) < n(A))$
1b $[C] = \operatorname{Syr}2k_{-}\operatorname{lt}(A, B, \widehat{C})$

$\left(\frac{C_{TR}}{C_{BR}}\right) \rightarrow$
,
$\left(\frac{C_{TR}}{C_{BR}}\right) \leftarrow$
·

Algorithm:  $[C] := \text{Syr}2\text{K_LT_BLK_VAR}3(A, B, C)$ 

$$A \to \left(A_L \middle| A_R\right), B \to \left(B_L \middle| B_R\right), C \to \left(\frac{C_{TL}}{C_{BL}}\middle| C_{BR}\right)$$

where  $A_L$  has 0 columns,  $B_L$  has 0 columns,  $C_{TL}$  is  $0 \times 0$ 

while  $n(A_L) < n(A)$  do

Determine block size b

$$\left( A_{L} \middle| A_{R} \right) \to \left( A_{0} \middle| A_{1} \middle| A_{2} \right) , \left( B_{L} \middle| B_{R} \right) \to \left( B_{0} \middle| B_{1} \middle| B_{2} \right) , \left( \frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \to \left( \frac{C_{00} \middle| C_{01} \middle| C_{02}}{C_{10} \middle| C_{11} \middle| C_{12}} \right)$$

where  $A_1$  has b columns,  $B_1$  has b columns,  $C_{11}$  is  $b \times b$ 

$$C_{11} := A_1^T B_1 + B_1^T A_1 + \widehat{C}_{11}$$

$$C_{21} := A_2^T B_1 + B_2^T A_1 + \widehat{C}_{21}$$

$$\left( A_{L} \middle| A_{R} \right) \leftarrow \left( A_{0} \middle| A_{1} \middle| A_{2} \right), \left( B_{L} \middle| B_{R} \right) \leftarrow \left( B_{0} \middle| B_{1} \middle| B_{2} \right), \left( \frac{C_{TL} \middle| C_{TR}}{C_{BL} \middle| C_{BR}} \right) \leftarrow \left( \frac{C_{00} \middle| C_{01} \middle| C_{02}}{C_{10} \middle| C_{11} \middle| C_{12}} \right)$$

endwhile